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SCIENCE AND TECHNOLOGY

No. 87

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WEST EUROPE REPORT

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THOMSON-CSF DEVELOPS FASTEST AMBIENT-TEMPERATURE CIRCUIT

Paris ELECTRONIQUE ACTUALITES in French 20, 27 Nov 81

[Articles by J. P. Della Mussia and F. Grosvalet]

[20 Nov 81 pp 1, 13]

[Text] The Central Research Laboratory (LCR) of Thomson-CSF has just built the fastest known semiconductor integrated circuit to operate at ambient temperature: only 22 picoseconds of logic gate propagation time in a circuit which integrates an 11-stage ring.

Up to now, the lowest switching times had been observed on Josephson junctions (on the order of 10 ps), but at a temperature close to absolute zero (with IBM being the world leader), and on an HEMT circuit (TEGFET in French), perfected by Fujitsu (17.1 ps per stage), operating at 77 degrees K.

The fact that the 22 ps have been achieved at 25 degrees C is a fundamental advantage; it could reorient all the research being conducted in laboratories which work on components for major computers, planned for after 1990. Moreover, LCR expects to further improve this performance.

The circuit in question uses a TEGFET structure. In particular, it takes advantage of electron confinement at the interface of GaAlAs junctions on GaAs, of molecular jet epitaxy, and of 0.6 micron electronic masking.

Details of LCR's work in this field will be given in our next issue.

[27 Nov 81 p 11]

[Text] The world's fastest ambient-temperature integrated circuit (22 ps logic gate propagation time in an 11-stage ring oscillator), presented last week by Thomson-CSF's LCR (see our issue of 20 November), is the fruit of several years of research in the field of GaAs-GaAlAs heterojunction transistors called TEGFET (two-dimensional electron gas MESFET).

Indeed, long before becoming interested in ultra-fast GaAs integrated circuits, LCR had conducted studies on the fabrication of discrete TEGFET devices; this has led to interesting results in the hyperfrequency domain, and to a good understanding of the physical phenomena involved in these structures. Last September, at the international conference on GaAs held in Tokyo, the laboratory presented the first normally-off, low noise, hyperfrequency TEGFET: 2.3 dB noise at 10GHz with an associated gain of 7.7 dB. This device, with an 0.8 micron line width, a drain-source gap of 4 micron, and a classic planar structure without V-groove, offers a performance comparable to that of the best conventional GaAs MESFET devices, which however, require more complex technologies (0.5 micron line widths with V-groove, 2.5 micron drain-source gap). Given these results, LCR has chosen normally-off TEGFETs as basic devices for ultra-fast or hyperfrequency logic integrated circuits. Activity on these circuits began at LCR early last September with the success that we have noted. Mobilities of 100,000 cm^2/Vs have even been obtained at liquid nitrogen temperature with 0.6 micron line widths (Fujitsu hopes to reach 60,000 cm^2/Vs with 1 micron).

In 1982, LCR will be carrying out its research in ICs as well as in the area of hyperfrequency discrete devices: in the first case the goal being to achieve at ambient temperature, speeds comparable to those of Josephson devices--which have to operate at temperatures close to absolute zero. If this objective is reached, the future of Josephson devices could well be strongly compromised; however, we must be careful not to give them up too soon, since they are still the best in terms of consumption. At the beginning, as is the case for all the laboratories in the world working on this problem, LCR will study TEGFETs at liquid nitrogen temperature, which according to Mr Linh, who is in charge of TEGFET research, will make it possible for the company to make more rapid progress.

In the hyperfrequency area, studies on the reproducibility of the devices presented in Tokyo, and the transition to 0.5 micron line widths, will be conducted in parallel, with the possible installation as soon as next year, of a pre-industrial development group such as the one that was created in 1976 for semiconductor lasers.

Molecular Jet Epitaxy, Basis of TEGFET

Unlike normally-off GaAs MESFETs, normally-off TEGFETs have a low input resistance, which allows low-noise operation. This property is associated with the existence of a shallow surface depletion zone, resulting from the actual structure of the TEGFET, where impurities and electrons are separated, with the latter being confined in a two-dimensional accumulation layer. The advantages of these new hyperfrequency transistors are not due solely to high mobility, but also to the intrinsic properties of the two-dimensional electron gas, which in particular, makes it possible to obtain a higher operating speed and therefore devices which operate at a higher frequency.

At the basis of TEGFETs we find molecular jet epitaxy, which because of its low growth rate (several angstroms per second) permits a good control of the thickness and doping of the various layers. LCR uses a RIBER installation which grows 10 layers per day on 2-inch substrates; it also participated in the development of this installation (there even exists a licensing agreement between the two companies for the improvement of molecular jet epitaxy installations).

The normally-off TEGFET presented in Tokyo was fabricated by depositing on a semi-insulating GaAs substrate a 1-micron p-type GaAs layer, followed by a 60 A undoped GaAlAs layer and a 700 A silicon-doped GaAlAs layer, the latter being reduced to 500 A by chemical etching (it is the thickness of this last layer that determines the normally-on or normally-off character of the transistor). For metallization, LCR has used a conventional planar structure in which the 0.8 micron-long Al grid is deposited directly on the last layer without any V-groove after deposition of drain and source contacts (gold-germanium eutectic on annealed nickel). The contact resistance measured on this type of device is less than 10^{-6} ohms cm .

11,023
CSO: 3102/66

ELECTRONICS

CAMECA COMMERCIALIZES FIRST X-RAY MICROLITHOGRAPHY EQUIPMENT

Paris ELECTRONIQUE ACTUALITES in French 20 Nov 81 pp 1,11

[Article by F. Grosvalet]

[Text] Cameca, a subsidiary of Thomson-CSF specializing in scientific instruments, officially announced on 12 November at Productronica, the commercialization of the first X-ray microlithography equipment. This instrument, the XPWS 301, is a 1/1 projection wafer stepper, with proximity operation and capable of directly inscribing 0.2 micron lines with an accuracy of 500 A on silicon wafers up to 3 inches in diameter (under ideal operating conditions, the instrument can inscribe 0.1 micron lines with an accuracy of 200 A). By comparison, the most sophisticated ICs presently on the market use 2 micron lines. Cameca is now accepting orders with a 10-month delivery date for this equipment, intended at first for research and development laboratories (at a price of 7.5 million francs).

Since submicron geometries are not expected to be in production before 1990, there is no current market for this type of equipment in the industrial field. However, the market for X-ray wafer steppers is not negligible at present: as we were told by Mr Gourgout, sales director for the microlithography division, based on polls conducted in the United States, Europe, and Japan, the French company estimates the worldwide demand to be 50 machines between now and 1985 (MackIntosh expects it to be 10-20 during the same period). The XPWS 301 was officially announced at Semicon/East in Boston (United States) last September, and since then, Cameca has received some fifty requests about it from small and large American companies (Bell Labs in particular). The French company hopes to become a leader in the field of X-ray wafer steppers and thus find itself in a good position for crossing the threshold into production (not before 1990).

It appears to be well positioned right now, being in fact the only one to commercialize an X-ray wafer stepper. Other companies have developed such machines for their own use (Bell Labs and IBM for instance), or are working in this area (NTT has recently announced a prototype which can inscribe 0.5 micron lines on 3-inch wafers at the rate of five wafers per hour), but none of them has advanced as far in fabrication. Moreover, this type of equipment fits very well into Cameca's primary domain, which is that of laboratories, much better than the other two microlithography devices (FEPG electronic masker and ARW 620 optical wafer stepper) manufactured by the company and less advanced in their design).

Just like the others, the XPWS 301, which was developed and perfected at LCR (Central Research Laboratory), will at first be manufactured at Courbevoie; a specific production unit could be built later if the market develops as planned (the decision should be taken next year).

X-Rays of 13.3 Angstroms Wavelength

Given the research orientation of its equipment, LCR has sought to obtain the highest possible resolution instead of high production rates. It is notable however, that according to Mr Gourgout, the XPWS 301 can be readily automated for pre-production, although many upstream and downstream problems remain to be solved by IC manufacturers before submicron technologies are placed in production. It is significant for instance, that in order to test its wafer stepper, Thomson-CSF was limited by the resolution of masks achieveable on LCR's electronic masker (0.3 micron at best); the full capabilities of the XPSW 301 could consequently not be tested (0.3 micron designs were inscribed on a PMMA-type standard resin). On the other hand, etching has so far had difficulties in keeping up with the progress of microlithography.

The performance of the XPWS 301 is based in part on the use of 13.3 A long X-rays (4.4 A is the usual wavelength) which make it possible to work by proximity (the distance between the mask and the slice varies between 5 and 20 microns, with 10 microns being considered optimum). Moreover, gold's good absorption at this wavelength makes it possible to obtain adequate contrast with a gold film of only 0.1 micron on the mask (0.6 microns are necessary at 4.4 A), thus eliminating shadow effects (the masks are also easier to make by depositing a 0.5 micron silicon nitride layer on a silicon substrate). In addition, an original (a patent has been issued) laser optical alignment technique based on diffraction patterns and Fresnel zones enables an accuracy of 500 A and total automation at this level.

The X-ray wafer stepper can handle wafers up to 3 inches in diameter, and has an exposure field of 100 square millimeters. It operates as a conventional wafer stepper, without reduction but under vacuum, with a much longer exposure time of 10-15 min for a PMMA-type standard resin (necessary for 0.2 micron lines), and of 1 min for a FBM110-type rapid resin, which makes it possible to achieve 0.3 micron at best.

11,023
CSO: 3102/59

FIRST FRENCH-MADE C-MOS UNCOMMITTED LOGIC ARRAY

Paris ELECTRONIQUE ACTUALITES in French 20 Nov 81 p 13

[Article by J.-P. Della Mussia]

[Text] The Microelectronics Department of the Military Applications Directorate (DAM) of the AEC, at Bruyere-le-Chatel in the Paris region, is expecting to receive in the next few weeks, the first uncommitted prediffused wafers (prediffused arrays) carrying an integrated circuit with 770 pairs of non-interconnected C-MOS transistors. This prediffused circuit was designed by AEC itself, based on its experience with the personalization of Interdesign prediffused C-MOS circuits. The circuit is diffused by EFCIS with its metal-mask economical C-MOS technology. It will be interconnected by AEC to obtain the desired patterns but will also be offered next year in the catalog of the new design center for custom integrated circuits which EFCIS is currently forming in the Grenoble region (AEC and EFCIS shared its development costs).

This circuit will therefore be usable by all those who want to personalize for themselves (or rapidly have personalized) prediffused circuits. The arrays will also be offered, but for personalization by organizations or companies which have hybrid thin film installations. To our knowledge, this is the first prediffused C-MOS circuit designed and fabricated in France. Several years ago, CII-HB in collaboration with RTC, had already designed a family of prediffused circuits using very fast CML technology, which are today mass produced in Caen at RTC's bipolar plant. TRT has also designed, and recently had RTC develop, linear prediffused circuits (see ELECTRONIQUE ACTUALITES of 18 Septem'er 1981) which it is now utilizing. And finally, the former Sescosem developed three years ago a prediffused linear circuit called the Polyuse, to meet the needs of the Thomson group. This circuit should be offered next April by the new custom circuit unit of EFCIS.

Replace C-MOS 4000 Cards

One and one-half years ago, when AEC began to be interested in prediffused circuits, its major goal was to place on its own chips, that which until then required a complete printed card. And prediffused circuits offered the advantage that they could be personalized by etching the metallization layers.

Consequently, this allowed them to withhold the secrets of their circuits from a custom manufacturer. Since most integrated cards called for C-MOS 4000 circuits, the AEC oriented itself toward prediffused C-MOS wafers, obtaining arrays from Interdesign through ATAC Diffusion. The etching of metallized layers created no problem for AEC/DAM because it already had installations for fabricating thin- and thick-layer hybrid circuits, the first of which also require metallization etching. (Actually, it very rapidly became clear that prediffused circuits were not competitors, but rather indispensible complements, of hybrid circuits).

This was followed by the logical step for all military materiel: to have a French source of prediffused arrays. AEC thus designed its array by keeping in mind the technologic resources of EFCIS's 5 micron metal-mask C-MOS line, which was entrusted with the diffusion of the circuit, just as in the case of a conventional custom circuit designed by a user at the EFCIS reception center at Velizy (an EFCIS terminal is in fact installed at AEC).

The designed circuit, known as MAA, is an improvement of the Interdesign circuit. The basic layout of the cells is of the 3 pair/2 pair type, as in the case of most C-MOS prediffused circuits (experience has shown that this is the most practical layout), but the operating frequency of a D flip-flop for instance, can reach 5 MHz and even 15 Mhz, if the circuit is supplied at 15 V as designed, and the input/output circuits at only 5 V. Of course, this dual supply voltage requires that the chip have a voltage level converter ahead of the inputs and outputs.

Up to 15 MHz

The MAA is also fully C-MOS or TTL compatible in input and output (even if everything is supplied at 5 V), by a simple modification of the metallization mask. No pull-up resistance is therefore necessary (TTL compatibility is obtained from inverter assymetry). Up to five TTL-LS loads can be driven in this way.

The number of input and output interfaces is 22 and 28 respectively, and the total number of pads is 55. The chip measures exactly 5.08 mm on a side, so that it can be handled equally well by metric and American machines (for instance, AEC has a wafer stepper calibrated in inches, while EFCIS has machines geared to 20 micron steps).

We have stated that the basic cells were organized into 3 pair/2 pair of transistors. Since the assembly thus has 770 pairs of transistors, the user has 154 available cells to represent an elementary function (flip-flop for instance) in integrating a circuit.

Eventually, a prediffused circuit that is four times smaller, at 2.54 mm on a side, could be developed with simplified inputs and outputs, so as to leave a maximum of room for the actual cell array.

It is not within AEC's objectives to offer prediffusion services to the outside, but the organization is ready to grant specific material support in this domain to French private industry, should some users encounter difficulties in the fabrication or personalization of their circuits. In the words of Mr Kumurdjan, director of the Microelectronic Department of AEC/DAM "We are beginning to develop a certain amount of experience with prediffused circuits, and we are fortunate in having available all the necessary equipment to personalize our circuits ourselves. So, if we have to help someone out of trouble.... We have actually already collaborated with private industry." In fact, AEC/Bruyere-le-Chatel has the design facilities, a wafer stepper installation, a far-UV exposure machine, chemical etching installations (as well as ion beam etching facilities, which however are not needed for this purpose), a tester, means for cutting wafers into chips, and mounting machines. Next year it will acquire, among others, an automatic tester and a CAO system with a powerful program for logic simulation and generation of test sequences.

11,023
CSO: 3102/58

BRIEFS

EEC MICROELECTRONICS PRODUCTION--Last week, in Brussels, the research ministers of the ten EEC member-countries, approved the launching of a community-wide program amounting to 40 million accounting units (an accounting unit is worth about 6.15 F), for the design of machines for microelectronic circuits. The project involves the construction by EEC industries, of wafer steppers, electronic maskers for wafers, plasma etching and deposition machines, and test equipment. In addition, CAO studies for VLSI (architecture, language, and structure of data, tests, device modelling) will be entrusted to industries and universities. [Text] [Paris ELECTRONIQUE ACTUALITES in French 20 Nov 81 p 1] 11,023

CSO: 3102/59

BBC WORKS ON NEW BATTERY FOR ELECTRIC CARS

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 24 Nov 81 p 5

[Article by G.M.: "BBC--One Step Closer to the Electric Car--Testing of Sodium-Sulphur Batteries"]

[Text] Brown, Boveri & Cie. (BBC), Mannheim--For 8 years the company has been working on the development of a "hot" battery operating at temperatures of 300 to 350 degrees Celsius. The battery concerned is a sodium-sulphur battery which, according to BBC, is capable of supplying four times the power of conventional lead batteries. Original ideas to utilize this battery as an aid in electrical power supply (storage) have not materialized due to economic issues. For this reason BBC has turned to the street vehicle as an area of application. In the company's opinion the sodium-sulphur basis has emerged as having the most potential for the future among other possible solutions.

Meanwhile a test battery has been tested. It is believed that the given aim can be reached at an expense of some DM 100 million; it would be a passenger car with a maximum speed of 120 to 130 km/h that accelerates to 50 km/h within 7 seconds and has a range of 250 km on one battery load. Loading would be possible overnight from a standard socket in one's own garage, although it would take about 12 hours. A different type of socket, however, would be available for quick loading. The difficult questions of infrastructure accompanying an introduction of the electric car on a wider scale are addressed by BBC by suggesting that parkometers would be conceivable as loading stations.

The battery itself, however, is only one aspect. A special suitable electric motor must be built, the manufacture of which would only be economical in large quantities (more than 100,000). This aspect is also of interest to BBC. The company even considers an electric transmission feasible some day. BBC, however, is not contemplating building entire electric cars themselves. This would be up to the auto industry. Corresponding discussions have already taken place, some with major German and U.S. manufacturers. At BBC it appears certain that major auto manufacturers have already made plans regarding electric cars. That does not mean much, however. We do not have to look at the problems of assiduous and successful improvement of combustion engines everywhere to realize the problems that would be faced trying to introduce electric cars as a means of mass transportation. Would it be accepted by the consumer at all as long as the "away from oil" slogan was

not all too pressing for him? For the time being the electric car would be a typical second car for city driving. The touring car with an electric drive is still in the pre-study stage. It is true that initially existing car types could be used; the optimal electric car, however, would have to be built differently from today's vehicle, and its design would have to be modified. This means that certain adjustments in the manufacture of cars would become necessary. BBC believes that it would not be all that much more expensive for car drivers than existing vehicles.

In addition to all of these difficulties, BBC, during their "key development," must also take into consideration the competition of other major companies working on the electric drive unit for the car. It is conceded that Chloride, a British company, might be a little further in their development of efficient batteries. BBC hopes that in 1984-85 a larger number of vehicles will feature their batteries; Chloride might be slightly ahead of them.

9544
CSO: 3102/76

BRIEFS

COAL GASIFICATION IN ITALY--The partnership of Ansaldo-Fiat-Westinghouse will build a gasification demonstration installation in the south of Italy. The process which will used was perfected by Westinghouse at its Waltz Mill pilot plant in Pennsylvania. The gas produced, with an intermediate calorific power, supplies a gas turbine; the products of combustion, whose temperature is of the order of 500 degrees C, are brought from the exhaust into a heat exchanger, where they transfer their residual heat to water, vaporizing it to supply a steam turbine. This is thus a mixed cycle. In addition, it is possible to trap certain pollutants (sulfur and carbon dioxide) during the gasification, and therefore to limit their effects on the environment. The project should be in operation in 1986, with a capability of 14 Megawatts of electric power. Other installations of this type are planned in Italy. [Text] [Paris Scoop ENERGIE in French 15 Oct 81 p 10] 11,023

COAL GASIFICATION PLANT--The board of directors of GdF has decided to build a coal gasification demonstration unit with a capacity of 1000 tons of coal per day. This plant, which will be installed at le Havre, could produce 300 million cubic meters of gas per year in 1985, to be used either as raw material for the chemical industry, or as a source of energy for large boilers. The call for bids could be issued before the end of 1981. GdF has chosen the Lurgi process presented by Creusot-Loire Industries because it can make use of coal of mediocre quality. But GdF also plans to combine it with the Texaco process, because the latter can complement it by treating the residues. This combination would have the advantage of lower production costs. In the longer range, GdF would like to achieve the production of synthetic natural gas, to replace real natural gas. An experimental methanization unit will be built for this purpose at Alfort. The importance of this project for renewed coal consumption must not be underestimated. However, one important point--financing--remains to be defined. The cost of the project is estimated at 550 MF (to which should be added 180 MF of exploitation expenses), which exceeds the self-financing capabilities of GdF. The orientation of the government's energy policy in favor of renewed coal consumption, raises the hope that it will provide financial support for this project. [Text] [Paris SEMAINE DE L'ENERGIE in French 9 Nov 81 p 13] 11,023

COAL CONVERSION FUNDS--The FRG Federal Government has decided to grant a credit of 1 GDM (by 1985) to four coal gasification projects (of Ruhrkohle, Shell, Rheinbraun, and Klockner), covering 40 to 50 percent of the financing. Three other projects (liquefaction) remain under study because of reduced public spending. A compensation of 60 DM/t will be awarded to the national coal so as to align it with imported coal. [Text] [Paris SEMAINE DE L'ENERGIE in French 9 Nov 81 p 13] 11,023

CSO: 3102/85

NEW METHOD FOR TESTING ALUMINUM PLATES FASTER, EASIER

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 23 Nov 81 p 7

[Article: "Ultrasonic Testing of Dry Aluminum Plates--Immersion in Water as Transmitting Medium Not Necessary"]

[Text] Frankfurt, 22 Nov--An ultrasonic testing device developed by British specialists in non-destructive testing of materials is probably the first of its kind worldwide to scan heavy aluminum plates by means of ultrasonic rays without their immersion in water as transmitting medium being necessary. The device tested and approved by the British Civil Aviation Authority and British Aerospace permits the Morgan-Ward Company to conduct testing much faster than was feasible so far with conventional procedures. In its present stage of extension the device built by Morgan-Ward for their testing facility will test plates made of aluminum or light metal alloys up to a length of 4 m and a width of 2 m.

The device can be easily extended to test even larger plates. During operation one plate after another is lifted by the suction cups of a lifting device and set on a mobile platform. Vacuum suction cups are used to avoid any damage to the plate surface. The platform moves the fixed plate along the x-axis across the scanning range. An ultrasonic system moving back and forth in the x-axis comprises ultrasonic probes operating at 10 MHz which are mounted on a collimator in a staggered arrangement. The collimator features a brush collar and is connected with a water column on the plate's bottom surface.

The water serving as transmitting medium is pumped up by a water container and divided into two sections to avoid a mixing with air and possible inaccuracies. The water returned from the probe collimator is removed from the plate's bottom surface following testing and fed into a reservoir where contaminations may deposit before it goes back to the pumping section. Any defect within the internal structure of the plate exceeding a limit set by the customer will trigger a warning signal. The testing is automatically interrupted; the exact location and extent of the defect can then be determined by means of conventional, portable ultrasonic devices.

In comparison with ultrasonic tests used so far, during which the plate to be tested had to be totally immersed in a water tank, this procedure offers the advantage that only the plate's bottom surface is in contact with the transmitting medium. According to the INDUSTRIAL RESEARCH AND DEVELOPMENT magazine, volume 19/1981, the upper surface will stay dry and is therefore accessible during testing.

9544
CSO: 3102/76

BRIEFS

UK, JAPAN ROBOTICS COOPERATION--Tokyo. Robotics; Anglo-Japanese negotiations. Fujitsu Fanuc Ltd., one of the first Japanese robot manufacturers, is to begin negotiations with 600 Group Ltd., the leading British manufacturer of machine tools, with a view to cooperation in the area of robotics, the 30 September edition of the newspaper NIHON KEIZAI announced. Before negotiating with the British company, Fujitsu Fanuc will consult with the German Siemens Ag group based in Munich, with which they have signed a contract to sell industrial robots on the European market, the same source indicates. Thus 600 Group Ltd. is already marketing Fujitsu Fanuc's robots in Great Britain thanks to a marketing agreement with Siemens. Anxious to become involved in the manufacture of robots itself, the British company, during a recent official British mission to Tokyo, communicated to the Ministry of International Industry and Commerce (MITI) its desire to come to a technological cooperation agreement with Fujitsu Fanuc. MITI seems disposed to encourage such collaboration, which would have the effect of reducing the friction produced by Japan's trade surplus vis-a-vis Great Britain. One recalls that the trade surplus totaled $1.8 million in 1980 and $1.2 million between January and July 1981. [Text] [Paris AFP SCIENCES in French 1 Oct 81 p 20] 9824

AEG-TELEFUNKEN, PEUGEOT COOPERATION--AEG-Telefunken is currently conducting negotiations aimed at reaching a cooperation agreement (technical developments and cross-fabrication) in the electrical equipment sector. This cooperation would extend and expand the trade agreements signed last April by the two companies, which will soon take effect. They cover the Peugeot sale to AEG of various hobby tools (electric drills and saws), with AEG supplying Peugeot with some 15 products for the professional market. In a next stage, the West German company, which is looking for partners to overcome its financial difficulties, is envisaging the creation of an independent company in the electric tool sector; Peugeot then appears as a natural choice. The electric tool sector (professional and public) of AEG-Telefunken employs 1800 people and does a business of 340 million DM. [Text] [Paris ELECTRONIQUE ACTUALITES in French 6 Nov 81 p 3] 11,023

CSO: 3102/58

SCIENCE POLICY

R & D DRAFT BUDGET FOR 1982 ADOPTED BY COUNCIL OF MINISTERS

Paris AFP SCIENCES in French 1 Oct 81 pp 2-4

[Text] The Council of Ministers at its meeting of 30 September adopted the draft budget for 1982. Total expenditures come to Fr 788.1 billion, an increase of 27.6 percent over 1981. The R & D budget is increased by 23.5 percent to Fr 23,466 billion.

The goal of a growth in R & D expenditures (public share and private) from 1.80 percent of the GDP [gross domestic product] in 1980 to 2.50 percent in 1985 has led to a substantial increase in civil budget R & D credits in 1982.

Program authorizations are upped by 35.9 percent, and general expenditures by 23.4 percent. The sum of these two categories of expenditures, which measures the real change in the research effort, represents an increase of 29.4 percent.

Concurrent with this rise in appropriations, the increase in number of new jobs created (1,727) attests the priority being given to research in the 1982 budget: This figure bears comparison with 767 new jobs created in the initial 1981 budget.

With respect to the interministerial research "envelope [French budgetary term for block sum within which individual apportionment may vary]" (see definition under chart: "Evolution of Civil Budget R & D Credits"), the policy axes being pursued are, in addition to the creation of jobs for researchers and technologists:

--The upgrading of research equipment and staffs, to make better use of their potentials;

--Development of large-scale scientific facilities;

--Implementation of prioritied sectoral efforts, such as electronics, robotics, biotechnology, and research efforts in cooperation with developing countries.

As regards technological development programs (see definition under above-mentioned chart), effort is being focused on the following sectors:

1) ANVAR [expansion unknown] and innovation: Twenty-two jobs are created to pursue the regionalization of ANVAR, in addition to the 22 jobs created and the 32 regularizations effected during 1981. ANVAR-Innovation program authorizations for 1982 increased in sum by 76 percent.

2) Computerization plan: Program authorizations under this plan are increased by 80 percent over 1981.

3) New energy sources: The development of new energy sources, a portion of which comes under the research envelope, is given a boost in a 50-percent increase in COMES [Solar Energy Commission] program authorizations.

4) Space and aeronautics programs: To pursue the space program, CNES [National Center for Space Studies] program authorizations are increased by 29 percent. Program authorizations for the major aeronautics programs are increased from Fr 1,337 million in 1981 to Fr 2,078 million in 1982, an increase of 55 percent.

The credits allotted to industry for 1982 represent a jump of 52 percent over the initial 1981 budget, to Fr 34.4 billion (program authorizations plus general expenditures).

Priority is given to general aids to industry, up 156 percent to nearly Fr 15,78 billion, which can be more easily used to fuel the jobs policy than sectoral or export aids.

FDES [Economic and Social Development Fund] allotments for loans to industry (up from Fr 1.5 billion to Fr 7 billion) are increased by a factor of 4.7 times. The PME [Small and Medium Businesses] fund is being increased by an addition of Fr 1 billion to its reserve.

Industrial policy allocations are up by a factor of 5.9 times (from Fr 237 million in 1981 to Fr 1,396 million in 1982). Together with the Fr 640 million for computerization, the total sum being allocated toward implementation of the industrial policy by the Ministry of Industry comes to over Fr 2 billion (versus less than Fr 600 million).

Appropriations for bonuses and other aides to regional development are upped by 62 percent to Fr 1,300 million. Lastly, in the food agricultural sector, program authorizations total Fr 405 million (+33 percent). This increase is centered mainly on the farming orientation bonus.

The 1982 defense budget shows an increase of 17.6 percent over 1981, with credits totaling Fr 122,855 million versus Fr 104,443 million.

Additional appropriations for strengthening the arms and services (+17.2 percent to FR 66,509 million) will specifically enable an increase of 25 percent in appropriations for operational fuel and the creation of 1,683 new jobs.

Appropriations for equipment (+18.2 percent to Fr 56,346 million) are increased mainly in the nuclear envelope (+18.5 percent) and the major conventional arms programs.

Evolution of Civil Budget R & D Credits
(in millions of francs)

Category	1981	1982	Percent Increase
1. General expenses (DO)	10,296.50	12,713.09	+23.4
2. Titles V and VI program authorizations (AP)	9,341.70	12,702.10	+35.9
3. Outpayments under existing AP's (CP)	8,697.60	10,753.69	+23.6
4. AP + DO	19,638.20	25,415.19	+29.4
5. CP + DO	18,994.10	23,466.78	+23.5
of which:			
Ministry of Research and Technology		(18,040.69)	
Other ministries		(5,426.09)	

Note: The civil budget for R & D consists of an interministerial research envelope and technological development programs, as follows:

--The interministerial research envelope contains credits for basic and exploratory research and credits for applied research.

--The technological programs include the credits for development; these programs are positioned downstream, in the research process, from the work done under the interministerial research envelope.

(A more detailed analysis of the different budgetary sectors involving R & D will be given in forthcoming AFP SCIENCES bulletins).

Environmental Budget: Fr 82,529.81 million

National Meteorological Budget: 556.14 million

9238
CSO: 3102/55

SCIENCE POLICY

CIVIL RESEARCH BUDGET RECEIVES PRIORITY STATUS IN FRANCE

Paris AFP SCIENCES in French 15 Oct 81 pp 1-16

[Text] Paris--A total of some Fr 52 billion is being allocated in the draft 1982 national budget to research and technological development in the public sector, said Mr Jean-Pierre Chevenement, minister of research and technology, in releasing his budget to the press on 12 October. For 1981, this figure may be estimated, after revisions, at around Fr 38 billion, instead of the Fr 31 billion at which it had originally been estimated last year.

To evaluate the total national R & D effort, it will probably be necessary to add, for the coming year, some Fr 20 billion, bringing the total to over Fr 70 billion.

As shown by one of the appended tables, military research expenditures for 1982 are estimated at some Fr 17.6 billion (a figure that is likely to be revised after the actuals are in and the real expenditures are known).

The civil research budget, excluding the PTT [Post and Telecommunications] supplementary budget (Fr 3.15 billion) and the "miscellaneous" other ones, notably the one for remuneration of teaching reasearchers (Fr 6 billion), will total Fr 24.4 billion, of which Fr 16.3 billion represent the interministerial research "envelope" [French budgetary term for block sum within which individual apportionment may vary], and the technological development programs budget will total Fr 9.1 billion.

As we have indicated in a previous article (see AFP SCIENCES No 277 of 1 October 1981, pp 2-4), the draft civil research budget, which is to be submitted to Parliament, represents a growth rate of the order of 29.6 percent, or, double that between the 1980 and 1981 budgets, which amounted to 16.8 percent. According to Mr Chevenement, "This is a quantitative break with past trends, a positive and decisive break."

The civil research budget thus becomes one of the national budget's first priorities. It constitutes a first stage toward the objective the government has set for itself, namely, to bring the national expenditure on research and technological development up to 2.5 percent of the GDP [gross domestic product] by 1985.

Although the increase in program authorizations and in general expenses appropriations is very adequate,the same cannot be said for the increase in outpayment credits (15 percent over the 1981 total), which Mr Chevenement recognizes is "a matter of concern." Necessary corrections will have to be made in this respect.

Following are the main features of this civil research budget, according to Mr Chevenement:

1. Priority to Employment.

This is exemplified by the creation of 1,727 new jobs, which are in addition to the 625 supplementary jobs created by the budget amendment of July this year (under extraordinary credits in the national budget). These new jobs, together with the measures improving the pay and allowances of engineers, technicians and administrative employees involved in research, are intended to provide new stimulus to the scientific and technical employment policy, which is indispensable to the growth of research.

2. Upgrading of Equipment.

This has to do with restoring to adequate levels the working facilities available to researchers, "which have undergone considerable degradation over the years." This is why, the minister indicated, "a special effort will be made--under the 1982 budget--to increase support credits for programs, which make up the day-to-day operations of the laboratories, and credits for equipment (intermediate equipment and large-scale scientific facilities).

The program authorizations will make it possible to:

--Begin immediately the upgrading of the operational facilities of research laboratories, which have undergone serious degradation over the past few years;

--Actualize the part of the 1982 plan providing for large-scale national and international scientific facilities especially in the domains of physics, space and oceanography (for example: the TORE SUPRA thermonuclear fusion reactor; the high-flux reactor of the Laue-Langevin Institute (Franco-Anglo-German); construction of the INAG [National Astronomy and Geophysics Institute] of the IRAM [Institute of Millimetric Radio Astronomy] in cooperation with Germany; installation of vectorial calculator; the Super ACO synchrotron radiation machine);

--Undertake research programs in the prioritied sectors in which the Ministry of Research and Technology has already begun to place missions.

3. The Prioritied Sectors.

In response to a question, Mr Chevenement had to agree that there has been very little change in the listing of sectors in this category over the one that had already been set up by the previous government, but said that "It takes more than just a few months to change things." In any case, the nationwide symposium is there to help define the new priorities, which will then be taken into consideration in the programs budget.

The sectors involved must have a strategic bearing on the independence of the nation, the competitiveness of its economy and the institution of a new model of growth. Six study missions have therefore been created in the following domains:

--Biotechnology;

--Rational use of energy, and new energy sources, supplemented by a geothermal energy mission;

--Electronics;

--Robotics;

--Research, employment and improvement of working conditions;

--Scientific and technical cooperation with the developing countries.

In 1982, the resources necessary for the development of research in these domains will be drawn from the agencies concerned and reinforced by supplementary financing from R & D funds.

4. Special attention is given to providing incentives for the development of industrial research and innovation. More than Fr 900 million are provided for this purpose.

As regards technological development programs, Fr 9,122.3 million are being provided for their funding in 1982.

In 1981, this funding totaled Fr 6.7 billion. The increase over 1981 amounts to 35.8 percent, as compared with a 14.9-percent increase in 1981 over 1980.

These programs, which do not include technological development programs in telecommunications, are the following:

Programs	AP + DO [*] (in millions of francs)	
Nuclear electronics program (CEA [Atomic Energy Commission])	3,395.6	
Space applications (CNES [National Center for Space Studies])	1,745.6	
Seabed mining program (nodules)	60	
Solar energy (COMES [Solar Energy Commission])	100	(1)
Informatics industries and applications (computerization plan)	658.3	
Informatics Agency (ADI)	167.5	(2)
Major civil aeronautics programs	2,078	(3)
Innovation (ANVAR [National Agency for the Valorization of Research] and DIT [Delegation for Innovation and Technology])	917.3	(4)
Total	9,122.3	

[*] AP=program authorizations; DO=general expenses.

[Footnotes to table on preceding page]:

(1) With the credits from the interministerial research envelope, the total budget of the COMES for 1982 will come to Fr 300 million, representing an increase of 52.4 percent over 1981.

(2) With the credits from the interministerial research envelope, the total budget of the ADI will come to Fr 280 million in 1982.

(3) These appropriations provide for the launching of the Airbus A 320 and of a new program for the development of "increased-fuel-economy engines."

(4) The credits for 1982 will enable the development of regional ANVAR agencies: 44 stations for these agencies, half of which were provided for in the amended budget adopted in July1981 and half being provided under the 1982 budget. These credits intended for aid to innovation will total Fr 720 million in 1982. They should be substantially increased, considering their role as regards incentives to the development of industrial research in the PMI [Small and Medium Business] sector, especially at the regional level.

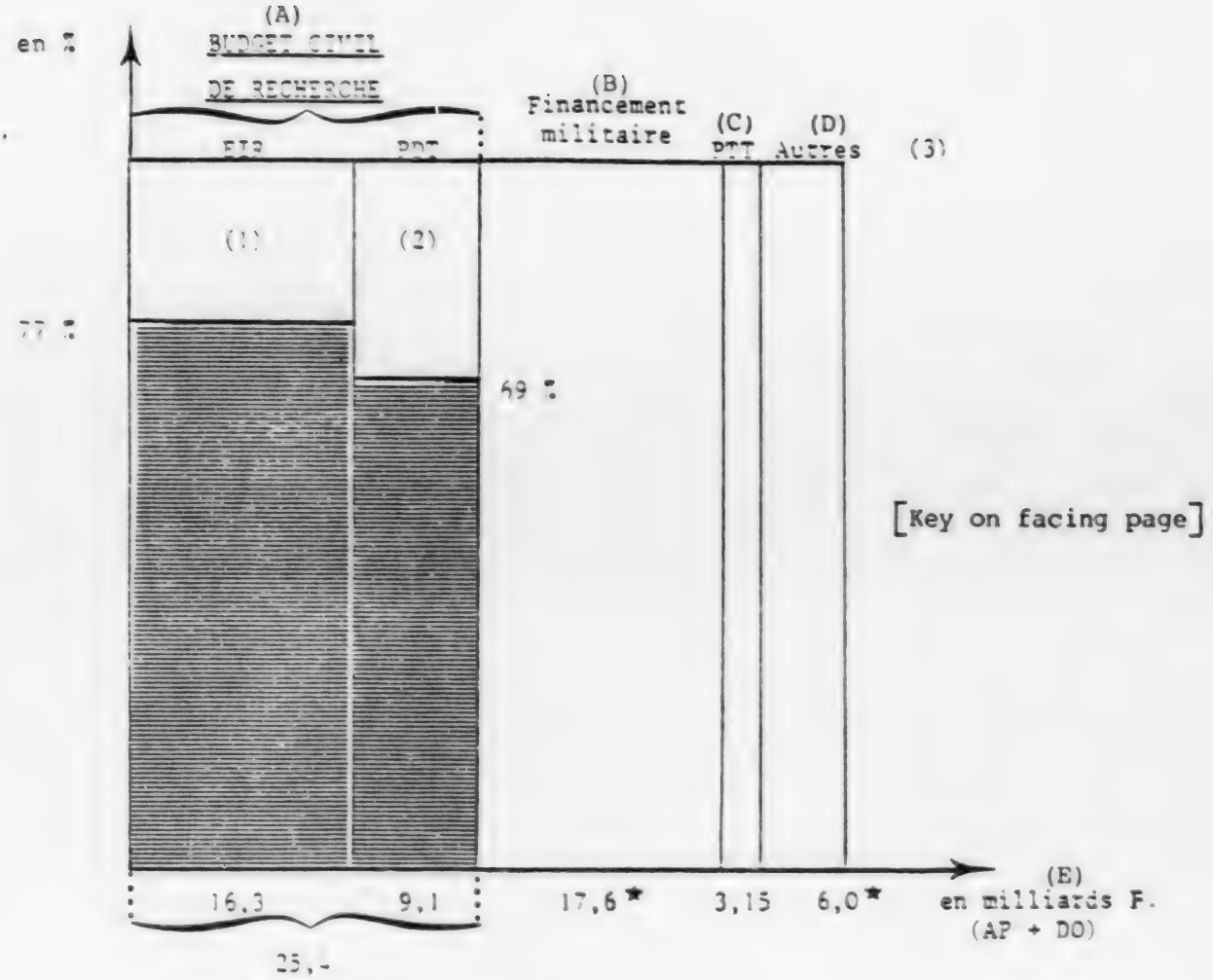
As regards the major research entities, see the appended tables.

One last but important point is that of scientific and technological information.

Considering its basic importance to the growth of research and technological development activities, be it in the form of data bases and banks, dissemination of scientific and technical knowledge, or publishing, credits for the scientific and technological information domain are being increased by more than 40 percent over 1981.

Public Funding of Research and Technological Development

Draft Budget for 1982



*estimations [estimates]

(F) Dotation budgétaire du Ministère de la Recherche et de la Technologie (MRT)

(G) EIR : Enveloppe interministérielle de recherche

(H) PDT : Programmes de développement technologique

(I) AP : Autorisations de programme

(J) DO : Dépenses ordinaires

(K) (1) : Organismes publics de recherche, services techniques, crédits d'intervention hors budget du MRT

(L) (2) : PDT dont les dotations ne figurent pas au budget du MRT aéronautique civile, plan informatisation, programme minier sous-marin

(M) (3) : pour l'essentiel, part de la rémunération des enseignants-chercheurs comptabilisée dans l'effort public de R. et D.

Public Funding of Research and Technological Development

Draft Budget for 1982

[continued from facing page]

Key to table on facing page:

A. Civil Research Budget.

B. Military Funding.

C. Post and Telecommunications.

D. Others (3)

E. In billions of francs--for AP and DO see key items I and J.

F. Budgetary allocation to the MRT [Ministry of Research and Development].

G. EIR: Interministerial Research Budget.

H. PDT: Technological development programs.

I: AP: Program authorizations.

J. DO: General expenses.

K. (1): Public sector research organizations and technical services, interventional credits outside the MRT budget.

L. (2): PDT for which appropriations are not included in the MRT budget (civil aeronautics, computerization plan, seabed mining program).

M. (3): Mainly, that portion of teaching researchers remuneration covered by public funding of R & D.

Draft Budget for 1982

The Pivotal Figures

Civil Research Budget

Item	1982	1981	Increase over 1981 (in percent)
AP* + DO**	25.4 MMF***	19.6 MMF***	29.6
Jobs created	1727	635 initial budget 625 supplementary budget (July 1981) 1260	37.1

Notes:

Between July 1981 and 1982, a total of 625 + 1727 = 2352 new jobs have been created.

* AP = program authorizations.

** DO = general expenses.

*** MMF = billion francs.

Draft Budget for 1982 [cont'd]

The Pivotal Figures

Interministerial Research Budget

Item	1982	1981	Increase over 1981 (in percent)
AP* + DO**	16.3 MMF***	12.9 MMF***	26.4
Jobs created	1580 620 ch# - 630 ITA# 30 ad cent# 300 reserved jobs	1250 555 ch# - 695 ITA#	26.4

Notes:

AP (program support and equipment):

1982: 6.0 MMF 1981: 4.6 MMF Increase: 32 percent

DO:

1982: 10.3 MMF 1981: 8.3 MMF Increase: 28 percent

CP****:

1982: 5.0 MMF 1981: 4.3 MMF Increase: 15 percent

* AP = program authorizations.
** DO = general expenses.
*** MMF = billion francs.
**** CP = outpayment credits.
#: ch = researchers; ITA = engineers, technicians, administrators; ad cent = central administration.

Technological Development Programs

Item	1982	1981	Increase over 1981 (in percent)
AP* + DO**	9.1 MMF***	6.7 MMF***	35.8
Jobs created	147	10	

* AP = program authorizations.

** DO = general expenses.

*** MMF = billion francs.

Evolution of Research Expenditures in France

Item	1959	1963	1967	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
DIRD* (millions of current francs)	3,078	6,392	12,228	16,621	18,277	19,789	23,031	26,203	29,774	33,185	37,671	44,123	50,500
DIRD (millions of 1967(1) constant francs)	4,169	7,261	12,228	13,379	13,838	13,912	14,512	14,579	15,046	15,396	15,920	16,868	17,315
Average annual increase in volume		14.9	13.9	5.0	3.4	0.5	4.3	0.5	3.2	2.3	3.4	6.0	2.6
DIRD/PIB** in percent	1.15	1.58	2.16	1.91	1.86	1.78	1.80	1.80	1.78	1.76	1.76	1.81	1.83

* DIRD = domestic expenditure on research and development; this figure represents the total spent on R & D work done within the national territory.

** PIB = gross domestic product.

(1) PIB price index.

x = tentative data.

Research Effort in Foreign Countries

Country	DIRD* billions of francs (1)		DIRD/PIB** in percent		DIRD/inhabitant in francs (1)	
	1978	1979x	1978	1979x	1978	1979x
United States	226.4	240.4	2.38	2.41	1,036	1,090
Japan	86.9	89.3	1.93	2.03	756	770
Germany	62.2	70.6	2.15	2.17	1,014	1,151
France	37.7	44.1	1.76	1.81	707	825
United Kingdom	30.6		2.16		547	
Italy	9.9	11.5	0.84	0.84	175	203

* DIRD = domestic expenditure on R & D; this figure represents the total spent on R & D work done within the national territory.

** PIB = gross domestic product.

(1) At current exchange rates.

x = estimates.

Evolution of Intensity of R & D Effort in France and Abroad

Country	DIRD*/PIB** in percent				
	1964	1969	1973	1977	1979(1)
United States	3.1	2.9	2.5	2.4	2.4
Germany	1.4	1.8	2.1	2.1	2.2
United Kingdom	2.3	2.3	2.1x	2.1xx	2.2xxx
Japan	1.5	1.6	1.9	1.9	2.0
France	1.8	2.0	1.8	1.8	1.8
Italy	0.7	0.8	0.9	0.9	0.8

* DIRD = domestic expenditure on R & D; this figure represents the total spent on R & D work done within the national territory.

** PIB = gross domestic product.

x = 1972; xx = 1975; xxx = 1978.

(1) tentative data.

Research Funding and Executive Structures in France

(millions of francs)

Item	1959	1963	1967	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980(1)
DNRD*	3,123	6,437	12,348	16,779	18,330	19,831	23,011	26,183	29,772	33,062	37,677	43,990	50,500
Financing by administrations(2)	2,173	4,424	8,770	10,617	11,451	12,179	14,130	15,735	17,226	19,114	21,682	24,641	28,800
Financing by private enterprise	950	2,013	3,578	6,162	6,879	7,652	8,881	10,448	12,546	13,948	15,995	19,349	21,700
Administration funding/ DNRD in percent	0.70	0.69	0.71	0.63	0.62	0.61	0.61	0.60	0.58	0.58	0.58	0.56	0.57
DIRD**	3,078	6,392	12,228	16,621	18,277	19,789	23,031	26,203	29,774	33,185	37,671	44,123	50,500
Execution by administrations(2)	1,678	3,277	5,936	7,284	7,707	8,265	9,500	10,586	11,782	13 186	15,171	17,863	20,300
Execution by private enterprise	1,400	3,115	6,292	9,337	10,570	11,524	13,531	15,617	17,992	19,999	22,500	26,260	30,200
Execution by enterprises/ DIRD in percent	0.45	0.49	0.51	0.56	0,58	0.58	0.59	0.60	0.60	0.60	0.60	0.60	0.60

* DNRD = gross national expenditure on R & D.

** DIRD = domestic expenditure on R & D; this figure represents total spent domestically on R & D work done within the national territory.

(1) = Estimate.

(2) = Public and private administrations (state, higher education, and nonprofit institutions).

Sources of Financing of Research and Development Budgets By Branches of Industry in 1979

Branch	Public Funding		Financed by Enterprise's Own Funds	Other Financing (1)	Total
	Millions of Francs	Percent			
Aeronautics	3,378	58	29	13	100
Electronics	1,501	28	57	15	100
Chemical	294	11	75	14	100
Energy	108	5	79	16	100
Engineering	97	23	28	49	100
Electric	91	9	86	5	100
Automobile	13	1	97	2	100
Other industries	322	4	82	14	100
All enterprises	5,804				

(1) Subcontracts received from other firms, from abroad, etc.

Principal Components of R & D Budgetary Funding

Component	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Research envelope (AP* + F**)	5,436	6,319	6,884	7,742	9,618	10,298	10,962	11,962	13,374	15,792
Research envelope (CP*** + F)	5,173	6,128	6,862	7,642	9,777	10,286	10,646	11,747	13,346	15,400
Military funding	3,900	3,900	4,350	4,650	5,050	5,600	6,100	7,550	9,350	11,350
University research funding	1,053	1,062	1,145	1,239	1,440	1,691	1,973	2,131	2,493	2,816
Civil aeronautics subvention	669	754	624	420	783	666	692	709	765	604
Post and Telecommunications	325	380	454	587	690	764	915	985	1,090	1,350
Others(x)	74	85	86	110	119	140	146	174	210	250
Total	11,194	12,309	13,521	14,648	17,859	19,147	20,472	23,296	27,254	31,770
Research envelope percentage of total	46.2	49.8	50.8	52.2	54.7	53.7	52.0	50.4	49.0	48.5

x Certain public bodies perform research and development that is difficult to dissociate from their general activities (National Institute of Statistics and Economic Studies, Bridges and Roads regional laboratories, agricultural and veterinary schools, Quality Research and Studies Center); the credits indicated on this line are an estimate of the funding pertaining to this work.

* AP = program authorizations.

** F = [expansion unknown].

*** CP = Outpayment credits.

Technological Development Program (PDT)

(millions of francs)

Program	General Expenses (DO)		Program Authorizations (AP)		Outpayment Credits (CP)		Total (DO + AP)	
	DO-1981	DO-1982	AP-1981	AP-1982	CP-1981	CP-1982	1981	1982
Electronuclear program	1,601.3	1,995.0	1,361.6	1,400.6	1,317.6	1,062.0(1)	2,962.9	3,395.6
Space applications	270.4	327.1	1,029.0	1,418.5	924.1	1,301.5(2)	1,299.4	1,745.6
Oceanic domain interventions (Ministry of Industry)	--	--	10.0	60.0	7.2	43.0	10.0	60.0
Solar energy interventions	--	--	65.4	100.0	35.0	71.0(3)	65.4	100.0
ANVAR	39.8	67.3	450.5	760.0	342.1	620.0	490.3	827.3
Innovational support	--	--	46.5	90.0	84.0	65.0	46.5	90.0
Informatics Agency	25.1	35.5	114.4	132.0	48.1	135.0(4)	139.5	167.5
Computerization plan (Ministry of Industry)	13.4	18.3	355.0	640.0	273.4	462.6	368.5	658.3
Large-scale civil aeronautics programs (Ministry of Transport)	--	--	1,337.0	2,078.0	1,331.5	1,989.0	1,337.0	2,078.0
Total PDT	1,950.0	2,443.2	4,769.4	6,679.1	4,363.0	5,749.1	6,719.5	9,122.3

(1) Of which Fr 180.0 million is for services voted under the Bleu "Industrie" [reference is unclear].
(2) " " Fr 75.0 million " " " " " " " "
(3) " " Fr 21.0 million " " " " " " " "
(4) " " Fr 66.0 million " " " " " " " "

Interministerial Budget for Research

New Jobs in the 1981 and 1982 Budgets

	Initial Finance Law 1981			Amended Finance Law 1981			Total Jobs Created for 1981			Finance Law 1982 (1)		
	Ch.	ITA	Total	Ch.	ITA	Total	Ch.	ITA	Total	Ch.	ITA	Total
Ministry for Scientific Research and Technology												
Central Administration	–	1	1	–	–	–	–		1	–	30	30
ANVAR [National Agency for the Valorization of Research]	–	–	–	–	54(2)	54	–	54	54	–	22	22
CNRS [National Center for Scientific Research]	240	41	281	99	130	229	339	171	510	348	160	508
INSERM [National Institute for Health and Medical Research]	55	35	90	13	45	58	68	80	148	65	90	155
Pasteur Institute	–	–	–	–	–	–	–	–	–	6	15	21
INRA [French Institute for Agronomical Research]	38	48	86	14	60	74	52	108	160	55	117	172
COMES [Solar Energy Commission]	–	20	20	–	28	28	–	48	48	–	10	10
CNEXO [National Center for the Exploitation of Oceans]	5	4	9	12	53(3)	65	17	57	74	15	12	27
ISTPM [Scientific and Technical Institute for Sea Fishing]	2	2	4	–	6	6	2	8	10	4	11	15
ADI [Data Processing Agency]	–	–	–	–	27(4)	27	–	27	27	–	–	–
INRIA [National Institute of Data Processing and Automation Research Rocquencourt]	5	4	9	5	12	17	10	16	26	10	18	28
CNES [National Space Studies Center]	–	–	–	–	–	–	–	–	–	–	25	25
CEA [Atomic Energy Commission]	–	–	–	–	–	–	–	–	–		100	100
ORSTOM [Overseas Scientific and Technical Research Office]	11	7	18	3	5	8	14	12	26	20	15	35
GERDAT [Study and Research Group for the Development of Tropical Agronomy]	12	–	12	4	4	8	16	4	20	20	15	35
Total for the Ministry of Research and Technology	368	162	530	150	424	574	518	586	1104	543	640	1183
Workers												
INED [National Institute for Demographic Studies]	2	1	3	1	1	2	3	2	5	1	3	4
CEE [Employment Studies Center]	1	2	3	1	2	3	2	4	6	1	3	4
Education												
Research Mission	4	20	24	–	10	10	4	30	34	4	80	84
Transportation												
EERM [Establishment for Meteorological Study and Research]	2	–	2	–	3	3	2	3	5	3	4	7
IRT[Transportation Research Institute]	–	–	–	–	–	–	–	–	–	7	3	10

[continued]

[continuation of Table: New Jobs in the 1981 and 1982 Budgets]

	Initial Finance Law 1981			Amended Finance Law 1981			Total Jobs Created for 1981			Finance Law 1982 (1)		
	Ch.	ITA	Total	Ch.	ITA	Total	Ch.	ITA	Total	Ch.	ITA	Total
Culture												
Research Mission	6	4	10	-	9	9	6	13	19	10	18	28
Housing												
Town Planning												
LCPC [Central Laboratory for Bridges and Roadways]	2	2	4	-	2	2	2	4	6	3	5	8
CSTB [Scientific and Technical Center for Building]	6	9	15	-	5	5	6	14	20	6	7	13
Justice	-	-	-	-	-	-	-	-	-	-	-	-
Land Planning and Management	2	1	3	-	-	-	2	1	3	-	-	-
Agriculture												
ACTA [Association for Technical Coordination of Agriculture]	-	-	-	-	-	-	-	-	-	-	-	-
CEMAGREF	-	7	7	-	5	5	-	12	12	2	5	7
Health - SCPRI [Central Service for Protection Against Ionising Radiation]	-	-	-	-	-	-	-	-	-	-	-	-
DOM-TOM [Overseas Departments - Overseas Territories												
TAAF [French Southern and Antarctic Lands	-	-	-	-	-	-	-	-	-	-	-	-
Ministry of Industry												
Mining Schools	17	7	24	2	10	12	19	17	36	10	10	20
IRCHA [Institute for Applied Chemical Research]	-	-	-	-	1	1	-	1	1	-	2	2
BNM [National Metrology Office]	-	-	-	-	-	-	-	-	-	-	2	2
BRGM [Bureau of Geological and Mining Exploration]	-	-	-	-	-	-	-	-	-	10	15	25
Data Processors											10	10
Total General	410	215	625	154	472	626	564	687	1251	600 (1)	807 (1)	1407 (1)

(1) Not included - 320 positions reserved for the MRT [Ministry for Research and Technology]
(2) Included is the integration of 32 officers into ANVAR.
(3) Included is the integration of 34 officers of CNEXO.
(4) Included is the integration of 15 officers into CESIA.

1981 Manpower of the Interministerial Budget for Research

Sectors / Bodies	Manpower 1980		Jobs Created Initial Finance Law 1981		Jobs Created Total 1981		Total Manpower 1981		
	Ch.	ITA	Ch.	ITA	Ch.	ITA	Ch.	ITA	Total
Ministry for Scientific Research and Technology									
DGRST [General Delegation for Scientific and Technical Research]	-	191	-	-	-	-	-	191	191
MIDIST [Interministerial Mission on Scientific and Technical Information]	-	8	-	1	-	-	-	9	9
DIT [Telecommunications Information Documents]	-	28	-	-	-		-	28	28
ANVAR [National Agency for the Valorization of Research]	-	145	-	-	-	54 (1)	-	199	199
CNRS [National Center for Scientific Research]	8 875	14 224	240	41	99	130	9 214	14 395	23 609
INSERM [National Institute for Health and Medical Research]	1 436	2 227	55	35	13	45	1 504	2 307	3 811
INRA [French Institute for Agronomical Research]	1 244	6 067	38	48	14	60	1 296	6 175	7 471
COMES [Solar Energy Commission]	-	62	-	20	-	28	-	110	110
CNEXO [National Center for the Exploitation of Oceans	104	387	5	4	12	53(2)	121	444	565
ISTPM [Scientific and Technical Institute for Sea Fishing]	123	156	2	2	-	6	125	164	289
ADI [Data Processing Agency]	-	119	-	-	-	27(3)	-	146	146
INRIA [National Institute of Data Processing and Automation Research]	151	213	5	4	5	12	161	229	390
CNES [National Space Studies Center]	273	807	-	-	-	-	273	807	1 080
CEA [Atomic Energy Commission]	1 650	3 250	-	-	-	-	1 650	3 250	4 900
ORSTOM [Overseas Scientific and Technical Research Office]	640	682	11	7	3	5	654	694	1 348
GERDAT [Study and Research Group for the Development of Tropical Agronomy]	459	466	12	-	4	4	475	470	945
Workers									
INED [National Institute for Demographic Studies]	46	90	2	1	1	1	49	92	141
CEE [Employment Studies Center]	24	31	1	2	1	2	26	35	61
National Education									
Research Mission	12	716	4	20	-	10	16	746	762
Transportation									
EERM [Establishment for Meteorological Study and Research]	142	89	2	-	-	3	144	92	236
IRT [Transportation Research Institute]	73	123	-	-	-	-	73	123	196
DFCEN	-	2	-	-	-	-	-	2	2

[continued]

[continuation of Table: 1981 Manpower of the Interministerial Budget for Research]

Sectors / Bodies	Manpower 1980		Jobs Created Initial Finance Law 1981		Jobs Created Total 1981		Total Manpower 1981		
	Ch.	ITA	Ch.	ITA	Ch.	ITA	Ch.	ITA	Total
Cultural									
Research Mission	140	250	6	4	-	9	146	263	409
Justice	12	67	-	-	-	-	12	67	79
Housing-Town Planning									
LCPC [Central Laboratory for Bridges and Roadways]	110	247		2	-	2	112	251	363
CSTB [Scientific and Technical Center for Buildings]	109	174	6	9	-	5	115	188	303
Agriculture									
CEMAGREF	65	132	-	7	-	5	65	144	209
ACTA [Association for Technical Coordination of Agriculture]	23	22	-	-	-	-	23	22	45
Industry									
Mining Groups	138	145	17	7	2	10	157	162	319
IRCHA [Institute for Applied Chemical Research]	35	89	-	-	-	1	35	90	125
BNM [National Metrology Office]	-	10	-	-	-	-	-	10	10
BRGM [Bureau of Geological and Mining Exploration]	170	173	-	-	-	-	170	173	343
BNIST [National Scientific and Technical Information Office and others]	-	2	-	-	-	-	-	2	2
Ministry of Health									
SCPRI [Central Service for Protection Against Territories]	-	127	-	-	-	-	-	127	127
Ministry of Planning	2	8	2	1	-	-	4	9	13
DOM-TOM [Overseas Departments - Overseas Territories]									
TAAF [French Southern and Antarctic Lands]	-	42	-	-	-	-	-	42	42
Environment	24	55	-	-	-	-	24	55	79
Total	16 080	31 626	410	215	154	472	16 644	32 313	48 957

(1) Included is the integration of officers into ANVAR (22 jobs)
(2) to CNEXO (54 jobs)
(3) to CESIA (15 jobs)

Ministry of Research and Technology

Breakdown of Endowments for 1982 in the MRT's Budget Plan (program authorizations (AP), payment appropriations (CP), ordinary expenses (DO))

(in millions of francs)

Ministry of Scientific Research and Technology Agency	Organizations	Program Authorizations AP 1981	AP 1982	Payment Appropriations CP 1981	CP 1982	Ordinary Expenses DO 1981	DO 1982	Total AP + DO 1981	1982
Ministry's intervention resources									
Funds + 56-00 MIDIST [Interministerial Mission on Scientific and Technical Information] DGRST [General Directorate for Scientific and Technical Research], research allocations and others		578,400	735,000	471,734	575,000	208,990 including extraordinary credits	296,554	787,390	1,031,554
DIT [Delegation for Innovation and Technology]	EIR [Interministerial Research Envelope]	2,500	30,000	2,500	10,000	3,713	4,214	6,213	34,214
	PDT [Technological Development Programs]	46,470	90,000	94,000	65,000	-	-	46,470	90,000
	Total DIT	48,970	120,000	96,500	75,000	3,713	4,214	52,683	124,214
ANVAR [National Agency for the Valorization of Research]	PDT	450,532	760,000	342,132	620,000	39,788	67,326	490,320	827,326
Total intervention resources									
	EIR	580,900	765,000	474,234	585,000	212,703	300,768	793,603	1,065,768
	PDT	497,002	850,000	436,132	685,000	39,788	67,326	536,790	917,326
	total	1,077,902	1,615,000	910,366	1,270,000	252,491	368,094	1,330,393	1,983,094
CNRS - National Center for Scientific Research and national institutes		1,040,000	1,378,400	1,023,800	1,176,000	3,709,340	4,567,827	4,749,340	5,946,227
INSERM [National Institute for Health and Medical Research]	EIR	268,500	352,000	255,000	312,000	566,145	689,674	834,645	1,041,674
	Paris EIR	48,500	68,000	42,490	62,000	61,624	75,307	110,124	143,307
	Lille EIR	5,000	8,000	5,000	9,000	-	-	5,000	8,000
	total health	322,000	428,000	302,490	383,000	627,769	764,981	949,769	1,192,981
INRA [French Institute for Agronomical Research]		220,000	295,000	212,000	249,000	998,062	1,214,207	1,218,062	1,509,207

[continued]

[continuation of Table: Breakdown of Endowments for 1982 in the MRT's Budget Plan]

Ministry of Scientific Research and Technology Agency	Organizations		Program Authorizations AP 1981	AP 1982	Payment Appropriations CP 1981	CP 1982	Ordinary Expenses DO 1981	DO 1982	Total AP + DO 1981	1982
CEA [Atomic Energy Commission]		EIR	449,700	615,000	421,300	368,000	1,054,060	1,251,200	1,503,760	1,866,200
		PDT	1,361,200	1,400,600	1,317,600	882,000	1,601,300	1,995,000	2,962,500	3,395,600
	total	CEA	1,810,900	2,015,600	1,738,900	1,250,000	2,655,360	3,246,200	4,466,260	5,261,800
CNES [National Center for Space Studies]		EIR	378,100	400,000	370,000	373,000	-	-	378,100	400,000
		PDT	1,028,980	1,418,470	924,080	1,226,464	270,400	327,115	1,299,380	1,745,585
	total	CNES	1,407,080	1,818,470	1,294,080	1,599,464	270,400	327,115	1,677,480	2,145,585
CNEXO [National Center for Exploitation of the Oceans]		EIR	200,355	264,030	187,555	206,030	103,674	136,350	304,029	400,380
ISTPM [Scientific and Technical Institute for Ocean Fishing]		EIR	10,450	35,000	10,350	21,100	47,047	57,973	57,497	92,973
	total	net	210,805	299,930	197,905	227,130	150,721	194,323	361,626	493,353
COMES [Solar Energy Commission]		EIR	121,800	180,000	97,400	71,000	12,108	20,000	133,908	200,000
		PDT	65,400	100,000	35,000	50,000	-	-	65,400	100,000
	total	COMES	187,200	280,000	132,400	121,000	12,108	20,000	199,308	300,000
ADI [Data Processing Agency]		EIR	76,000	115,000	59,000	49,000	-	-	76,000	115,000
		PDT	114,440	132,000	48,120	69,000	25,060	35,500	139,500	167,500
	total	ADI	190,440	247,000	107,120	118,000	25,060	35,500	215,500	282,500
INRIA [National Institutes of Data Processing and Automation Research-Rocquencourt]		EIR	41,600	65,000	36,600	44,000	72,270	91,876	113,870	156,876
Total for data processing			232,040	312,000	143,720	162,000	97,330	127,376	329,370	439,376

[continued]

[Continuation of Table: Breakdown of Endowments for 1982 in the MRT's Budget Plan]

Ministry of Scientific Research and Technology Agency	Organizations	Program Authorizations AP 1981	AP 1982	Payment Appropriations CP 1981	CP 1982	Ordinary Expenses DO 1981	DO 1982	Total AP + DO 1981	1982
Pasteur Overseas	EIR	2,800	4,000	2,800	4,000	7,496( )	8,816	10,296( )	12,816
ORSTOM [Overseas Scientific and Technical Branch Office]	EIR	53,300	71,000	54,800	69,000	317,734	390,048	371,034	461,048
GERDAT [Study and Research Group for the Development of Tropical Agronomy]	EIR	56,350	75,000	56,950	74,000	185,594	227,122	241,944	302,122
total	OM	112,450	150,000	114,550	147,000	510,824	625,986	623,274	775,986
Total for Ministry of Research and Technology									
I	EIR	3,553,355	4,690,430	3,309,279	3,672,130	7,347,857	9,031,168	[illegible],212	13,721,598
II	PDT	3,067,022	3,901,070	2,760,932	2,912,464	1,936,548	2,424,941	5,003,570	6,326,011
III	Total	6,620,377	8,591,500	6,070,211	6,584,594	9,284,405	11,456,109	15,904,782	20,047,609

NB: It is appropriate here to point out credits for the whole 1981 budget:

(1) ANVAR AP 60,000 CP 30,000 Budgeted for the Ministry of Industry
CNEXO AP 1,419 CP 1,419

(2) The cost of job creations in 1981 projected for the total:
MRT 23,058 MF (million francs) included in the 208,990 MF
CNEXO 3,256 MF
COMES 1,750 MF budgeted for the Ministry of Industry
ADI 1,687 MF
ANVAR 1,400 MF

(3) including transfers from the Ministry of Industry (from BNIST [National Office for Scientific and Technical Information] and SEPOR [expansion unknown]

(4) IPOM: [expansion unknown] 4,050 comes under the Budget for Cooperation

Also included under Ordinary Expenses for some organizations are transfers between ministries.

(in millions of francs)

Ministry/Organization	Program Authorizations AP 1981	AP 1982	Payment Appropriations CP 1981	CP 1982	Ordinary Expenses DO 1981	DO 1982	Total TTC (AP+DO) 1981	1982
Ministry of State for Interior and Decentralization	4,200	5,000	3,200	6,900	0,297	0,334	4,497	5,334
Ministry of Transportation								
IRT [Transportation Research Institute	10,500	21,000	10,500	19,000	34,901	42,772	45,401	63,772
Meteorology	28,600	34,000	28,000	32,000	34,831	41,668	63,431	75,668
Incentive Actions								
Research Mission	125,600	173,000	123,600	125,000	0,418	0,473	126,018	173,473
--Civil Aviation	96,000	134,000	96,300	98,000	-	-	96,000	134,000
--Other incentives	29,600	39,000	12,500	27,000	-	-	29,600	39,000
Total	164,700	228,000	162,100	176,000	70,150	84,913	234,850	312,913
Ministry of the Plan	13,500	15,700	10,500	13,000	2,474	2,745	15,974	18,445
Ministry of Justice	-	-	-	-	10,262	11,597	10,262	11,597
Ministry of External Relations	-	-	-	-	429,259	482,250	429,259	482,250
Secretary of State for the Ministry of the Interior in charge of: DOM-TOM [Overseas Departments-Overseas Territories] DOM-TAAF [Overseas Departments - French Southern and Antarctic Lands]	6,800	14,000	6,800	9,800	15,269	17,427	22,069	31,427
Ministry of National Education	569,300	719,200	573,200	709,200	100,116	138,886	669,416	858,086
Ministry of Agriculture								
Central Administration (research allocations)	-	-	-	-	4,928	4,928	4,928	4,928
CEMAGREF [expansion unknown]	7,300	12,000	7,300	8,800	20,206	25,117	27,506	37,117
ACTA [Association for Technical Coordination of Agriculture]	6,300	8,000	9,000	5,900	5,969	6,931	12,269	14,931
IAA [Agricultural and Alimentary Industries]	10,000	13,000	6,000	8,800	-	-	10,000	13,000
Total	23,600	33,000	22,300	23,500	31,103	36,976	54,703	69,976

[continued]

[continuation of Table]

Ministry/Organization	Program Authorizations AP 1981	AP 1982	Payment Appropriations CP 1981	CP 1982	Ordinary Expenses DO 1981	DO 1982	Total TTC (AP+DO) 1981	1982
Ministry of Industry								
Central Administration from SEPOR BNIST [National Scientific and Technical Information Office]	-	-	-	-	1,923	0,115	1,923	0,115
Mining Schools	6,700	13,800	6,700	9,300	56,476	68,051	63,176	81,851
IRCHA [Institute for Applied Chemical Res.]	9,500	11,200	9,500	11,000	23,752	28,110	33,252	39,310
BRGM [Bureau of Geological and Mining Exploration]	40,900	57,000	42,500	51,300	56,302	69,467	97,202	126,460
BNM [National Metrology Office]	9,170	13,000	9,170	7,800	7,899	9,179	17,069	22,179
Total	66,270	95,000	67,870	79,400	146,352	174,922	212,622	269,922
Ministry of Culture	20,670	30,000	21,570	27,500	51,729	64,590	72,399	91,590
Ministry of Labor								
INED [National Institute for Demographic Studies]	6,200	8,000	6,000	7,500	22,271	27,030	28,471	35,030
CEE [Employment Studies Center]	2,100	2,700	2,000	2,000	8,808	11,405	10,908	14,105
Total	8,300	10,700	8,000	9,500	31,079	38,435	39,379	49,135
Ministry of Health								
SCPRI [Central Service for Protection Against Ionising Radiation]	6,500	8,500	6,500	8,500	20,186	23,568	26,686	32,068
Curie Institute	2,600	4,500	2,600	4,200	8,223	9,562	10,823	14,062
Total	9,100	13,000	9,100	12,700	28,409	33,130	37,509	46,130
Ministry of Urban Affairs and Housing								
LCPC [Central Laboratory for Bridges & Roads]	16,700	21,500	11,000	15,800	42,439	51,249	59,139	72,749
CSTB [Scientific & Technical Center for Bldgs]	21,100	28,000	19,000	29,300	55,277	68,201	76,377	96,201
IGN [National Geographic Institute]	6,900	8,500	6,300	9,000	-	-	6,900	8,500
Incentives	37,500	48,000	34,700	51,700	24,063	27,960	61,563	75,960
Total	82,200	106,000	127,700	105,800	121,	147,410	203,979	253,410
Ministry of Environment	29,300	38,000	28,300	14,000	0,779	0,875	30,079	38,875
Ministry of Maritime Affairs - Incentives	22,000	25,000	8,000	16,200	0,973	1,094	22,973	26,094
Total EIR [Interministerial Research Envelope]	1,019,940	1,332,600	1,048,640	1,203,500	1,040,030	1,235,584	2,059,970	2,568,184

R & D: FRANCE, FRG COOPERATION, FRG BUDGET OUTLINES

Paris AFP SCIENCES in French 5 Nov 81 pp 4-7

[Text] Paris. Promotion of Franco-German cooperation in research and technology.

Franco-German cooperation in research and technology will be strengthened and extended to new areas; the ministers responsible for research, Andreas von Bulow and Jean-Pierre Chevenement, confirmed this intention at a labor meeting in Paris 29 October.

The two ministers, who had already met in Bonn last 12 and 13 July, insisted on the fact that the industries of the two countries "will be able in the long term to have an impact on international competition" owing to close cooperation in recent technological developments, turning to profit "the opportunities they offer for the creation of new products."

"The close relations between France and the FRG constitute a top priority," Chevenement stressed. "The coordination of our efforts in certain areas of basic research is absolutely necessary, since the latter is so expensive," von Bulow declared for his part.

Here are some specific details concerning the main topics investigated by the two ministers of research during their meeting in Paris:

1) Improvement in cooperation, and in scientific and technological exchanges. Detailed cooperation in the policies for innovation and industrial development of the two countries will be undertaken. The study of prospects for Franco-German scientific audiovisual coproduction intended for the general public is pledged. The decision to award several prizes each year for Franco-German scientific cooperation was also made.

2) Space. Chevenement passed on to his German interlocutor the results of the limited council of 15 Oct 1981 on space.

The two ministers emphasized the interest they take in the development of European cooperation, especially in the European Space Agency, and agreed to cooperate in the Ariane 4 programs and in the development of orbital platforms.

3) Modern technology for the use of charcoal. The gasification of charcoal, stressed Chevenement and von Bulow, "opens up a very large potential field of cooperation between the two countries and is of prime interest for the future."

4) Nuclear programs. Franco-German cooperation is "essential for the two countries." The two ministers proceeded to an exchange of viewpoints on the respective programs of France and the FRG, and on cooperation especially with regard to reprocessing and breeder reactors.

5) Working conditions. The two ministers decided on the creation of a joint labor group to examine the possibility of cooperation with regard to the improvement of working conditions. The Detraz mission that takes care of this problem in France will shortly go to Germany. The FRG spends 120,000 DM per year in this area, whereas in France research fund expenses are at present only 20,000 Fr.

6) Oceanology and climatology. Several projects are being studied. It was reported that the opportunity of using French ships, submarines, and research devices will be offered to German researchers.

7) European affairs. Chevenement presented to his German colleague the French memorandum on European revival which includes an important chapter on research and innovation in Europe, from the point of view of the next EEC research ministers' council which will be held next Nov 9 in Brussels.

8) Major scientific equipment. Franco-German cooperation is already very significant in this respect (the Langevin-von Laue Institute, the Daisy accelerator in Hamburg, the millimetric wave radio telescope etc.). Means to strengthen this cooperation further, particularly by the reciprocal use of research installations in the two countries, will be studied.

9) Electronics. The two ministers agreed on the necessity of promoting European cooperation in this area, which is decisive for competition between Europe and the other major industrial countries, particularly in microelectronics.

10) Scientific and technical information. It was decided to promote very active cooperation in this area by reinforcing the links between the CNRS [National Center for Scientific Research], the MIDIST [Interministerial Mission on Scientific and Technical Information] and their German counterparts.

The 1982 Budget of the West German Ministry of Research and Technology (BMFT)

The federal government's draft budget for 1982 provides a subsidy of 6,536.4 billion DM to which must be added 280 million DM by way of supplementary assistance to other departments destined for micro-electronics, optic telecommunications and iron and steel metallurgy.

The increase of 460,000 DM, i.e., 7.6 percent of BMFT funds, only half compensates for the abatements effected the two preceding years in the medium term finance plan established in 1979.

The main features of the 1982 budget are the following:

1) Basic research, to which about 30 percent of the research budget is devoted, remains a first priority.

2) As far as realization structures are concerned, the major research centers receive 25 percent of the budget and are to be the object of measures designed to facilitate flexibility and the undertaking of new jobs, hence the reduction by 7.5 percent of their personnel expenses.

Major projects (KALKAR, Antarctic HTR, linear motor etc.)	3,561.900 DM
Research centers and installations	2,246.400 DM
International cooperation (ESA, Spacelab, AIEA)	680,100 DM
Operation of the administration and ministry	48,000 DM

3) At the sectorial level, priorities are:

--Energy, with a 40 percent share of the budget and 2,618 million DM. The overruns in the total cost of the SNR-300 KALKAR breeder reactor, estimated today as costing 5 million DM, necessitate a total grant from the electric companies of 1.4 million DM, that is to say, 300,000 DM for 1982.

--Space, with an increase of 10 percent, which will be curbed beginning in 1983. The financing of the Franco-German direct television satellite program necessitates a 180,000 DM grant from the Federal Ministry of Mail and Telecommunications, its future user and exploiter.

--Microelectronics and the new communications techniques which increase by 20 and 38 percent respectively, and will receive 140,000 and 76,000 DM.

--Biotechnology increases by 24 percent and reaches 83,000 DM.

Receiving a minimum increase:

--the health field.

--the improvement of working conditions.

Receiving a reduced allocation:

--transport.

The distribution of expected resources according to objectives and programs can be seen in the appendix.

BMFT'S 1982 BUDGET

Objective		Program	Financial resources DM (millions)	Percentage
Guarantee of material resources	1.	Research and techniques in the area of energy.	2618.7	40.1
	2.	Research and development in raw materials (H2O included) and materials.	242.5	3.7
	3.	Research and oceanological techniques, polar research.	213.8	3.3
Maintenance and/or improvement of industrial competitiveness	4.	Assistance for innovation	28.4	0.4
	5.	Physical techniques, production techniques.	78.0	1.2
	6.	Electronics.	140.0	2.1
	7.	Data processing.	52.0	0.8
	8.	Space research and technology, aeronautical research.	915.1	14.0
Improvement in living conditions	9.	Techniques relative to health, nutrition, and the environment.	470.0	7.2
	10.	Improvement in working conditions.	118.0	1.8
Modernization and upgrading of infrastructures and public services	11.	Transport technology, building research.	253.0	3.9
	12.	Communication technique, information technology.	131.0	2.0
	13.	Information-documentation.	85.3	1.3
Basic research	14.	Financing of diverse scientific activities.*	564.6	8.6
	15.	Physics-chemistry basic research.	578.1	8.8
Administrative expenses			48.0	0.7
		Total	6536.0	100.0

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*Not a part of other programs.

9824
CSO: 3102/84

BRIEFS

MINISTRY OF INDUSTRY BUDGET--Marked increases in the industry budget in 1982. The ministry of industry budget for 1982, which increases to 10.4 billion Fr in program authorizations and ordinary expenses (+50 percent compared with 1981), was adopted by the National Assembly last 15 November. In addition to these funds, the ministry of industry will have jurisdiction over open endowments, included in the Research and Technology budget, for the benefit of the five big organizations (CNES [National Center for Space Studies], AEC, COMES [Solar Energy Commission], ADI [Data Processing Agency], and INRIA [National Institute of Data Processing and Automation Research]). These funds will, in fact, be transferred at the beginning of 1982 to the Industry budget which guarantees their administrative and financial management. The sum total of program authorizations relative to industrial policies (2170 billion Fr) and ordinary expenses (88 billion Fr) increases to 2258 billion Fr (compared with 769 billion Fr in 1981). In addition, endowments for the benefit of the FDES [Economic and Social Development Fund] and other organizations will make it possible to free an additional 7 to 8 billion Fr for industrial policies. Out of the 2258 billion Fr, 986.91 billion Fr will be set aside for general allocations for industrial policies, 765 billion Fr will go towards the development of data processing industries and applications (as against 469 billion in 1981), so as to assist with the financing of projects related to small data processing, the SSCI's office automation, the development of automation and of CAO [Computer-aided Design], and to microelectronics, and 348 billion Fr will be assigned to the adaptation of industrial structures. Of the technological development policy resources (4395 billion Fr), 1816 billion Fr have been apportioned to AEC, 2145 billion Fr to CNES (+28 percent), 314 billion Fr to INRIA and ADI (data processing and automation), and the rest will go to chemistry and the other technological development programs. [Text] [Paris ELECTRONIQUE ACTUALITES in French 20 Nov 81 p 2] 9824

CSO: 3102/60

REPORT ON LAUNCHING OF JOINT FRENCH-ITALIAN ATR-42 PROJECT

Brussels LA LIBRE BELGIQUE in French 14/15 Nov 81 p 12

[Article by Pierre Sparaco: "France and Italy have launched a new 'regional' aircraft, the ATR-42. Sonaca perhaps a candidate for subcontract work."]

> [Excerpts] The launching of a new airliner is always something of an event, a fortiori if it is a European venture. A few days ago, Aerospatiale and Aeritalia decided to undertake the construction of a twin engine aircraft in the 40 seat category, the ATR-42 (42 seat Regional Transport Aircraft), of which the first models in the series will be ready for delivery by the end of 1985. It is a "first" in terms of Franco-Italian aeronautical relations, the more remarkable for the fact that the two partners opted for an equal distribution of investments. In principle, the door is open to associates or subcontractors who submit their applications quickly. Sonaca might be interested.

Taking into account what is in principle a very substantial potential market (perhaps nearly 3,000 units from now to the end of the century), 20 years after the first race to produce a successor to the DC-3, many design departments went back to work again. In France, for example, Aerospatiale first of all studied the AS-35 project (36 to 44 seats), while the Italian group, Aeritalia, badly in need of a civil cargo plan, undertook the study of the AIT-230 with the same clientele in mind. Soon, the two companies realized the similarity of their approach and joined forces to develop the ATR-42 project.

Since the initial investments to be taken into account amounted to about 1.2 billion Fr, this speculation required careful consideration even though it was appreciably less ambitious than, for example, the launching of a new member of the Airbus family. At the time of the Bourget exhibition of last June, the manager of Aerospatiale's aircraft division, Andre Etesse, indicated that the prospects looked good, especially in the United States; several companies had already placed orders for some 40 models.

From that moment therefore, the ATR-42 was virtually launched. The timetable announced at the Bourget exhibition has been actually observed and the project is

now under way, on the basis of about 60 orders and options. Equipped with two 2,200 hp Pratt and Whitney turbines together with four-bladed propellers, this new European airliner will carry 42 to 46 passengers at more than 500 km per hour, while consuming 45 percent less fuel, according to its promoters, than do older aircraft.

It is precisely Fokker that risks paying for this project, at least in the immediate future. Sacrificing the essential element of their resources to a much more ambitious project, the twin jet aircraft MDF-100 with 150 seats, which they are endeavoring to develop jointly with McDonnell Douglas, the Dutch manufacturers have only just mentioned the possibility of installing new engines in the F-27. Furthermore, the ATR-42 will not be the only one on the market. In Canada, De Havilland is working on a comparable Dash 8, while C.A.S.A. (Spain) and Nurtanio (Indonesia) are also working on a regional aircraft with the same capacity.

One Family?

The Franco-Italian enterprise is more ambitious than appears at first sight. One notes, for example, that the final assembly line will be set up in Toulouse, but that a second line is planned for Naples, for military versions. Moreover, two additional variant models are already planned, an ATR-42F equipped for freight transportation, and the ATR-42QC Quick Change (is that not a name registered by Boeing?) which can be rapidly adapted from a passenger setup to one for cargo.

In the long term, an ATR-XX is to see the light of day; it will be a longer aircraft, with greater capacity. It will doubtless constitute a first step towards 80 or 100 seat aircraft equipped with propellers of completely new design, in the Profan multiblade line being developed by the Hamilton Standard company in the United States. It is an option to be followed attentively, insofar as one thus already sees the outline of one of the short/medium range aircraft of the future, with the propeller snatching some of the jets' prerogatives, theirs for two decades, and all this because of the oil crisis.

Hardly spectacular, admittedly, the ATR-42 is perhaps assured, in this context, of a very brilliant future. On the other hand, it is surprising that Aerospatiale and Aeritalia have apparently foregone any association with an American partner, who would have facilitated access to one of the largest potential markets. On the other hand, and this no doubt explains all that, the Franco-Italian group has nonetheless already found American buyers.

In principle, at least, each of the two companies is willing to cede 10 percent of its share to other partners. With that in mind, Sonaca established contacts with Aerospatiale several months ago. If these are maintained at the theoretical level, the Charleroi company having informed us this week moreover that it is still interested, one may legitimately wonder how negotiations could be concluded satisfactorily within a sufficient brief span of time.

Sonaca's general director, Marcel Claisse, observed to us that it is difficult to maintain two investments simultaneously. A priori, it is advisable to leave the door open to Belgian participation in the A-320 Airbus. If the latter is in fact launched in the next few months, which is plausible, taking into account the

poverty of Belgian resources, the present new political interlude and the absence of sufficiently clear aeronautical rules of play, there is a good chance that the ATR-42 will be added, from the Belgian point of view, to the list of lost opportunities.

Nevertheless, although unable to claim a role as full partner with Aerospatiale and Aeritalia, Sonaca could still be included among the subcontractors in the Franco-Italian program. On condition, in any case, that they are in a position to come up with adequate financial resources and, above all, a level of competitiveness which compares favorably with other applicants. But clearly to take flight the ATR-42 will not wait for a possible Belgian contribution.

9824
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AEROSPATIALE, AERITALIA ACCORD ON CONSTRUCTION OF ATR 42

Paris L'HUMANITE in French 9 Nov 81 p 3

[Text] The ATR 42, a true regional service aircraft. In presenting his budget to the deputies, Charles Fiterman informed them that an agreement had been reached on Saturday between the French company Aerospatiale and the Italian firm Aeritalia for the manufacture of the ATR 42 regional transport aircraft. The plane will be a twin turboprop (engines with turbines and propellers, consuming less fuel), in the 42-seater range, designed to land and take off on short runways (which reduces the importance of land acquisitions). It will be built by the two firms which will participate equally in the venture. The French minister of transport, Charles Fiterman, and the Italian minister of industry, Giovanni Marcora, expressed satisfaction with the agreement and, in a joint communique, their desire "that cooperation between the industries of the two countries, in the field of civil aeronautical construction, might extend to other projects of common interest."

The new ATR 42 Franco-Italian aircraft is to go into service by about the second half of 1985. It will be equipped with 42 to 49 seats (indeed, more than 60 seats in the elongated version) and will be suitable for flights from 370 km to 1,300 km. Its turbopropellers will be supplied by Pratt and Whitney of Canada. According to the studies of specialists, the civil world market for an aircraft of this type will amount to more than 3,700 aircraft over the next 20 years, and Aerospatiale and Aeritalia hope to capture nearly a quarter of this market and to sell up to 900 planes. It was mentioned at Aerospatiale that already, even before the decision to embark on the construction of the ATR 42, some 60 tentative orders had been placed. The assembly lines will be installed in Toulouse for the passenger version and in Italy for the cargo version (up to 4.7 metric tons of freight). Aerospatiale will be responsible for the general architecture, the construction of the wings, and the fitting out of the cockpit and cabin. Aeritalia will be responsible for the fuselage, the stabilizers and the landing gear. In France, the realization of this program will mean the creation of 4,300 jobs between now and 1988.

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TRANSPORTATION

'NEW-TECHNOLOGY-WING' PRODUCTION AT DORNIER

Stuttgart FLUG REVUE in German Dec 81 pp 42-43

[Article by Hellmut Penner: "Technology Wing--The Construction of the Advanced Airfoil of the New Do 228 Dornier Aircraft"]

> [Text] Age-old principles in combination with the most modern technology: Just as the dugout canoe is sculpted from a tree trunk, the wing of the new Dornier utility and commuter aircraft series Do 228 is milled from a single slab of aluminum. The advantages of this new wing construction technology have been fully recognized by foreign aircraft manufacturers, especially those in the United States.

There is a continuously increasing supply of products in the aircraft market worldwide. During the last few years even Third World countries like Spain, Israel and Brazil have tried their hand in the commuter aircraft business. This does not make it very easy for a country with the highest labor cost, such as the FRG, to remain competitive in aircraft construction.

Additionally, to enter a market which had been fairly well saturated previously would appear to be very daring indeed.

Nevertheless, Dornier decided to take this daring step, with the 228 utility and commuter airplane. On the world market, it is in direct competition with the Embraer EMB-110 from Brazil, the Canadian De Havilland of Canada DHC-6 Twin Otter, the British Shorts Skyvan, Australia's GAF Nomad N22B and the Spanish CASA C 212 Aviocar.

To obtain a nominal share of the market for this class of aircraft, it was necessary for Dornier to convert its experience gained with the multipurpose aircraft Do 27 and Do 28D Skyservant into a new, even more economical, generation of aircraft.

As we have previously reported (in FLAG REVUE August 81), the process is based on the well-proven unit construction system which was derived from the Skyservant fuselage. The Do 228 wing is a new development which holds promise for the future. Its better lift coefficient and improved L/D ratio not only make it more economical, but also make its production more cost effective because of the use of the most modern manufacturing processes.

The chief of Dornier's "New Wing Technology" (TNT) project, Dipl.-Ing. Wolfgang Haberland, provided some insight to FLUG REVUE on the reason for the firm's final decision to produce the Do 228 in series. In Haberland's opinion, such major aircraft manufacturers as Beech, De Havilland of Canada, Cessna, Piper or Swearingen are at present unable to interrupt production of successful models with new developments. The firms he listed have oriented their production toward large numbers of conventional aircraft models.

With a product mix consisting of almost 75 percent of military contracts, Dornier employs a large number of engineers who must be kept busy at all times. The Alpha Jet project, which served to accumulate a wealth of experience, has been most fruitful in that capabilities no longer needed for it can be fully used in the TNT/228 program. Because of its new finite element method and its computer assisted application, the same software is almost automatically usable.

NC machines which had been acquired for producing the Alpha Jet have, at the end of that series, a few capabilities available which can be used to good advantage in the Do 228 program.

The central component of the Do 228 wing in both versions is the wing panel which until now had to be produced at great expense in a conventional manner. These panels, which carry the leading edge, the flap systems and the engine suspension mounts, had previously in all aircraft factories of the world been constructed in a very costly puzzle assembly of individual parts, including spars, ribs, stringers and skin. A chaotic jumble of side-by-side rivets provided the necessary tensile strength to the aerodynamic profile.

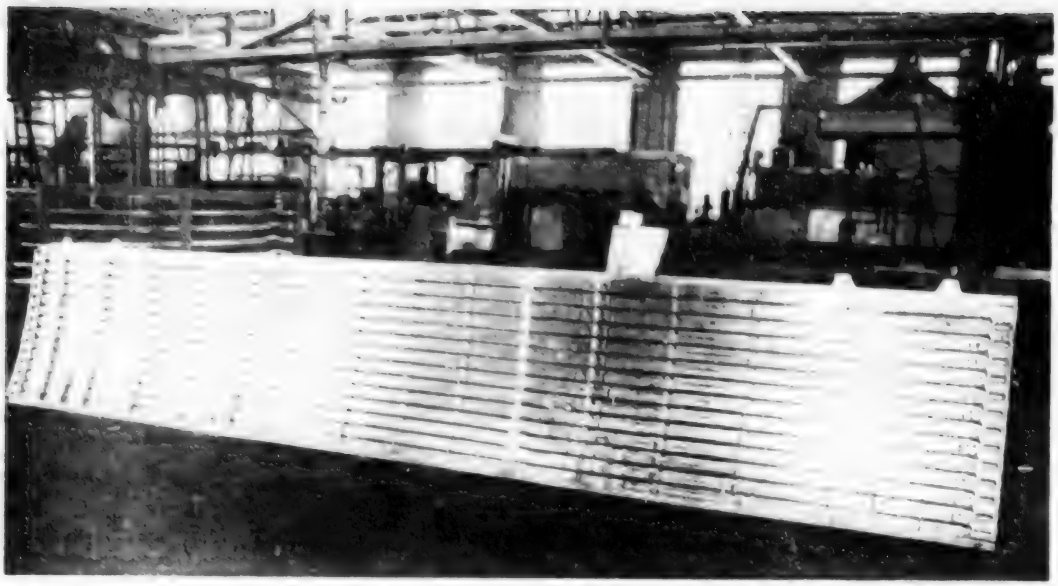
The result of this time consuming construction procedure is a great need for special tools which must be made by hand for every part under construction. In shop talk, this is known as preparatory work. It is obvious that skilled workers who do this type of work are highly paid.

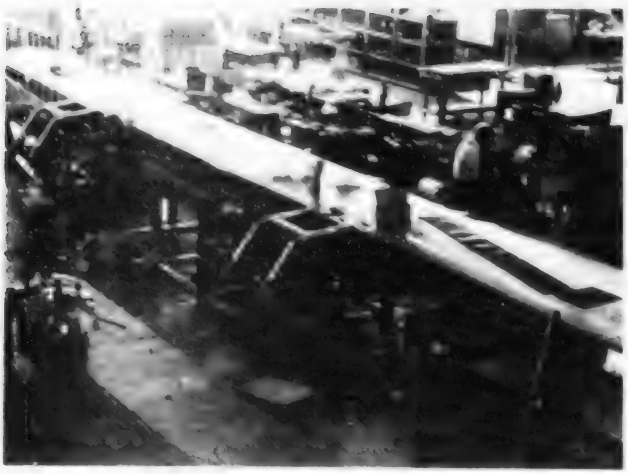
The picture is entirely different in at least some of the subsections of the Dornier plant. The panels for the new Do 228 project are milled from a single aluminum slab, whereby the longitudinal and transverse ribs, and spar flanges all form a part of the integral structure. Milling operations successively employ coarse, finishing and spherical cutters so as to obtain a structure resembling a casting as closely as possible already at the end of the milling operation.

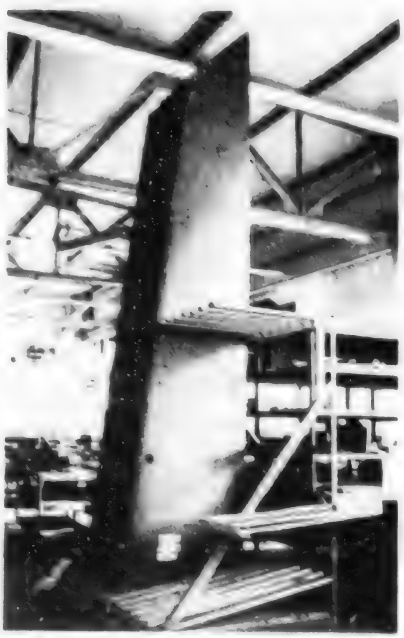
Tool relief is already provided for in the computer program. What is left is a skeleton with flange widths of 1.2-2.8 mm and base thicknesses measuring 1.2 mm. The aluminum slab milled in this manner is then given the desired aerodynamic profile with a computer controlled compression process newly developed by Dornier. In this process the rib flanges are compressed by movable hydraulic compression grippers. This compression or crushing procedure is performed with the help of a computer program and requires only one single skilled worker.

The compression points are at a distance of about 10 cm from one another. Any surface cracks caused by the milling process are eliminated by shot peening and subsequent slurry jetting. These are expedient procedures which had already

Conventioral fuselage, wing of the future: assembly line production of Dornier's Do 228 utility and commuter aircraft.







been used in Alpha Jet production. The two half shells thus produced are riveted together at the joint abutments. Total fabrication time is thereby reduced to 28-30 hours.

The upper surface of one of these half shells appears to have undergone a true spherical deformation. Actually, it consists of a polygon with the above described 10 cm intervals. The concavity, i.e., the deviation from the ideal profile, amounts to less than one-tenth of 1 millimeter.

Advantages of this procedure:

--a saving of up to 10 percent compared with rivet construction;
--lower weight;
--increased profile accuracy;
--production can be accomplished in three shifts;
--elimination of riveting cost;
--30 percent savings in production cost;
--life increase to 24,000 operating hours;
--immunity from salary increase costs.

The Dornier development department believes that the newly developed wing profile with its cited advantages becomes important only because the novel milling-compression procedure guarantees the requisite surface accuracy. In the meantime the new production technology has been recognized worldwide and especially by American aircraft manufacturers. Dornier is making efforts to engage in further marketing of the know-how it has gained.

9273
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RENAULT 9: SIMPLIFIED ASSEMBLY, EXTENSIVE USE OF ROBOTS

Paris L'USINE NOUVELLE in French 26 Nov 81 pp 138-139

[Article by Michel Defaux: "Renault Facilitates the Work of its Robots"]

> [Text] Quality, productivity, less assembly time. The specifications for the latest car from Regie Renault were particularly exacting. Close collaboration between the research office and production services made it possible to simplify the Renault 9 and to use robotics more extensively.

"Close collaboration between the research office and the various services of industrial management solved by anticipation some difficult car assembly operations."

This statement by Josef Deudeurwaeder, Director of the Douai plant, was made at the presentation of the Renault 9, and it gives a good example of the process that has led to the conception of a car that is simple and easy to assemble: from the beginning of the project, a close association was sought between production services and the people in charge of designing the product. "In addition to the normal planning work," Mr Ursault, chief of the R9 project, explains, "we have added factory methods, which has emphasized the simplicity of the product."

The R9 is Automated by Robot at 1,580 Points

This kind of organization has also made it possible for factory management to have a more important role in determining operations and output. The Douai plant was thus able to choose its own technical solutions. For reasons of productivity, quality and investment, the plant opted for the "all robot" solution as concerns floor assembly and chassis finishing. There are a total of 104 Acma-Cribier robots that spot-weld engine housings, front and rear frames, floorboard undergirdings, chassis finishings and that load and unload assembly lines, apply soundproofing undercoating, etc.

"To get the robot lines started, we took maintenance people and assembly methods that had been working on the R-14 robot lines," said Dominique Cousin, head of the Douai robot project. "The use of robotics at this level is very important. You can judge for yourself: on the R-14, which had 4,110 welding points, 3,200 were automated, and 280 by robots (5.45 percent of the total); on the R-18, in Flins in 1978, the robots did 10 percent of the automated points; today, on the latest Renault, 3,305 points are automated, 1,580 of these by robot for a proportion of 38 percent.

"The solution adopted has required an investment within 5-10 percent the same as that for multiple-point welders. But when there are other models to build, we can easily go over to another kind of production." In any case, the cost of the robots is unimportant relative to that of the whole production line (especially maintenance equipment): out of the 600 million francs spent on all the R-9's metalworking, robots account for only Fr 70 million, or a little more than 10 percent.

200 Robots Programmable to Manage the Unit

There are a lot of modifications over the latest existing automated lines. Thus, to go from one welding station to another, the Douai installations use a new means of transport (hydraulic motors linked to an electronic control unit) that is twice as fast as the conventional roller tables. To manage the unit, no fewer than 200 programmable robots have been installed. On the robotized lines, an SMC 500 connected at the conveyor level governs the transfer line, while an SMC 200 controls four robots at once. "Even on specific machines, we have gone from electromechanics to programmable automata. It's a technique that we had to get everyone to accept."

All welding torches are fixed, that is, they are opened only as much as necessary. This increases productivity and electrode life (less severe shocks), and it makes hard to reach places more accessible. Especially advanced studies have been made on arm-end equipment (a torch 800 mm long sufficiently light and resistant has been developed from techniques discovered in aeronautics to weld in the center of the tunnel). Finally, the robots are fitted with welding timers that control currents with precision and insure even quality. "With these robots," Dominique Cousin says, "we will convince the research offices that we can maintain quality control, that is, zero bad welds in class 1 and 0.2 percent in class 2. This can be accomplished. On future vehicles we can have 6-7 cm steps between two points instead of the 5-cm steps we have now."

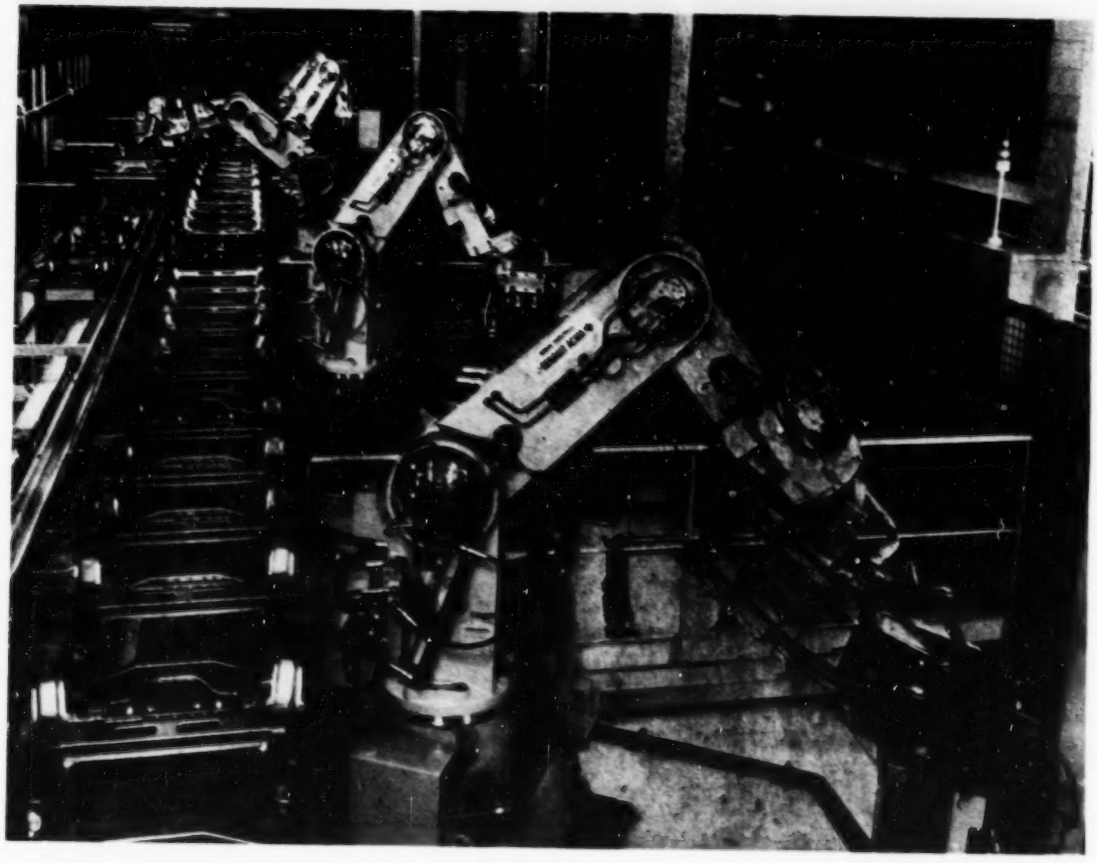
As for maintenance, production loss caused by robot breakdown must not exceed 0.5 percent. "When a breakdown occurs, you have 5 or 6 minutes to fix it. Any longer and you have to call in human operators. We are working on another solution that will have a second robot do the work of the one that is out of service."

Collaboration between the research office and factory has borne fruit in assembly, too. "That is where we spend most of our production time. We have kept assembly time within the amount allotted and we have even attempted to exceed goals. The object was to shorten the time spent on the assembly line." A good example: the assembly of the front wheel drive train is done on 120 cable-guided trucks moving through the plant. At each station, the engine housing receives in turn the motor, suspension, universal joints, brakes, shock absorbers, bars, springs, radiator, etc. Working conditions are better: you no longer have to work with your arms over your head or leaning over the fender. Quality is improved, too: hose connections and clamps are more accessible."

Before leaving this zone, the conveyor goes by the adjustment station. "All adjustments in the front end of the power train are done outside the car. This procedure has shortened assembly time by 10 percent." The frame and forward power train combination is then positioned under the body. Four automatic bolting machines then make the final assembly of motor housing and body.

Some pieces have been modified. "Thus, a multi-piece assembly (trim, name plate) has been replaced by a single, injected piece," Henri Bourgue explained. Mr Bourgue is head of factory industrialization, an outreach of the research office. Similarly, a change in design has led to discontinuing the rear power train alignment and to mechanizing the assembly process. Another example: the heating has been changed. "We asked the research office to consider monobloc technology, without cutting back on performance, of course. The work saved 50 percent of assembly time."

These steps will make assembly times very competitive with other products, even those from Japan. The object at the outset was to save 30 percent of assembly time, that is, to decrease it from 30 to 20 hours. The challenge has been met.



Spot-welding of engine housings: seven robots grasp the housings on the conveyor and place them under the welding machines.

Finishing of the R9 chassis. The gigs carrying the chassis have a magnetic label which allows the robots to recognize the type of vehicle to be welded. When the assembly line was put into operation, models R5 and R9 passed through the same line without any problems.

8792
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EXPANSION OF HIGH-SPEED TRAIN NETWORK TO BE PROPOSED

Paris AFP SCIENCES in French 29 Oct 81 p 43

[Article: "Railways/High-Speed Trains/France"]

[Text] Nantes--Atlantic TGV [high-speed train] project: The Atlantic TGV project will be submitted for government approval before the end of 1981. If it is accepted, the TGV serving the Atlantic coast could go into service in 1988, according to a press release by Mr Guy Verrier, national director of new lines in the SNCF [French National Railways], in Nantes on 22 October.

The main station will be Paris-Montparnasse. Then, on the unused roadbed between Montrouge and Massy-Palaiseau, a "new TGV line," which will be the trunk line for the future Atlantic TGV, will be constructed as far as Voves, south of Paris, where it will fork towards Tours and Le Mans.

From Le Mans and Tours, the TGV will use already existing lines: first, towards Nantes, the first line to go into service; second, towards Rennes and the north of Brittany; third, from Tours to Bordeaux over present lines, since the TGV is compatible with present roadbeds.

Thus, Le Mans and Tours will be one hour from Paris (as opposed to 1:40 at present; Nantes and Rennes will be 2 hours from the capital (now 3:00); Bordeaux, 3 hours (now 3:50). Many other cities will be served by the Atlantic TGV: Laval, Angers, Poitiers, Angouleme, Quimper, Brest, etc.

The Atlantic TGV will thus accompany the decentralization of French regions and contribute, according to the SNCF, to restabilizing them by considerably improving service to the regions of Brittany, the Loire valley, Poitou-Charentes, Aquitaine, and the whole Atlantic coast, which contains more than 10 million people (20 percent of the population of France).

According to the SNCF, the rail traffic affected by the Atlantic TGV project includes about 19-20 million travelers divided about equally between the two axes of the west coast. The traffic should include nearly 25 million travelers when the project is completed.

Construction and conversion work on the infrastructure and superstructure could begin in 1983 if the government approves the project submitted by the SNCF.

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Feb 16, 1982